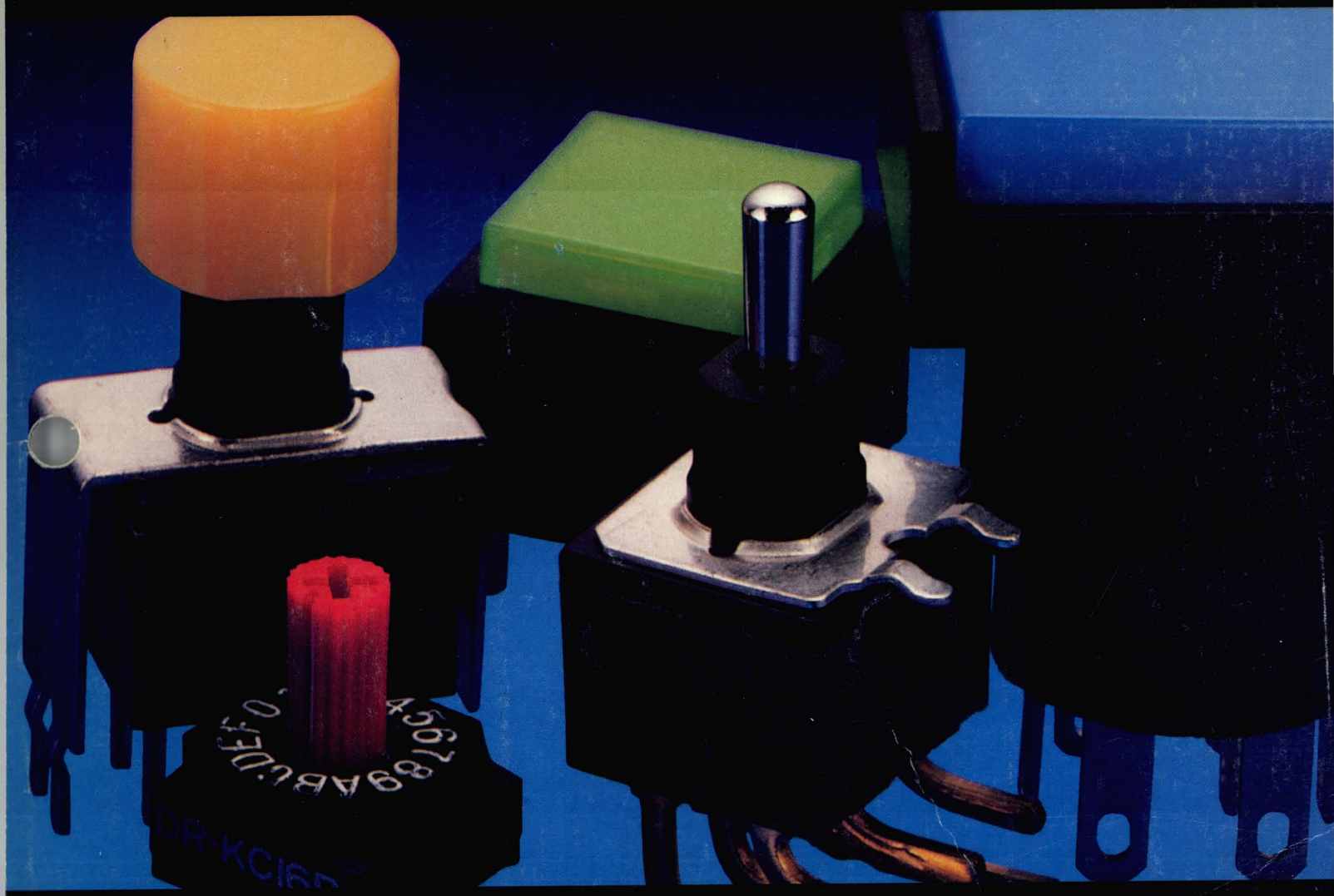
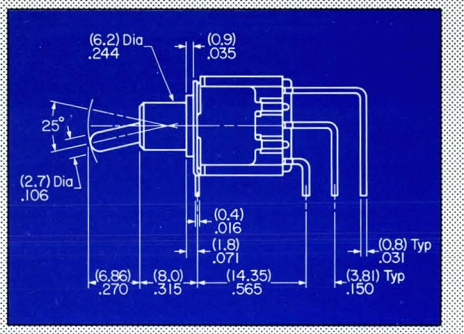
Design Guide For The '90s



nkk switches

DESIGN GUIDE



Reliable, innovative designs begin with this reference source. Inside, well over a million options are presented. A unique "Switch Builder" guide at the beginning of each section, allows the engineer to quickly identify the exact switch circuit, terminations, actuator, etc. needed to complete a design. Thousands of precision dimensional drawings permit cut and paste design-ins. Backed by over 40 years of excellence, NKK is dedicated to providing the finest switch products and service available. For additional information or assistance with custom designs, call NKK for fast courteous service: 1-602-991-0942.

RELATIVE SIZE COMPARISON

HIGH CAPACITY
PS S SW

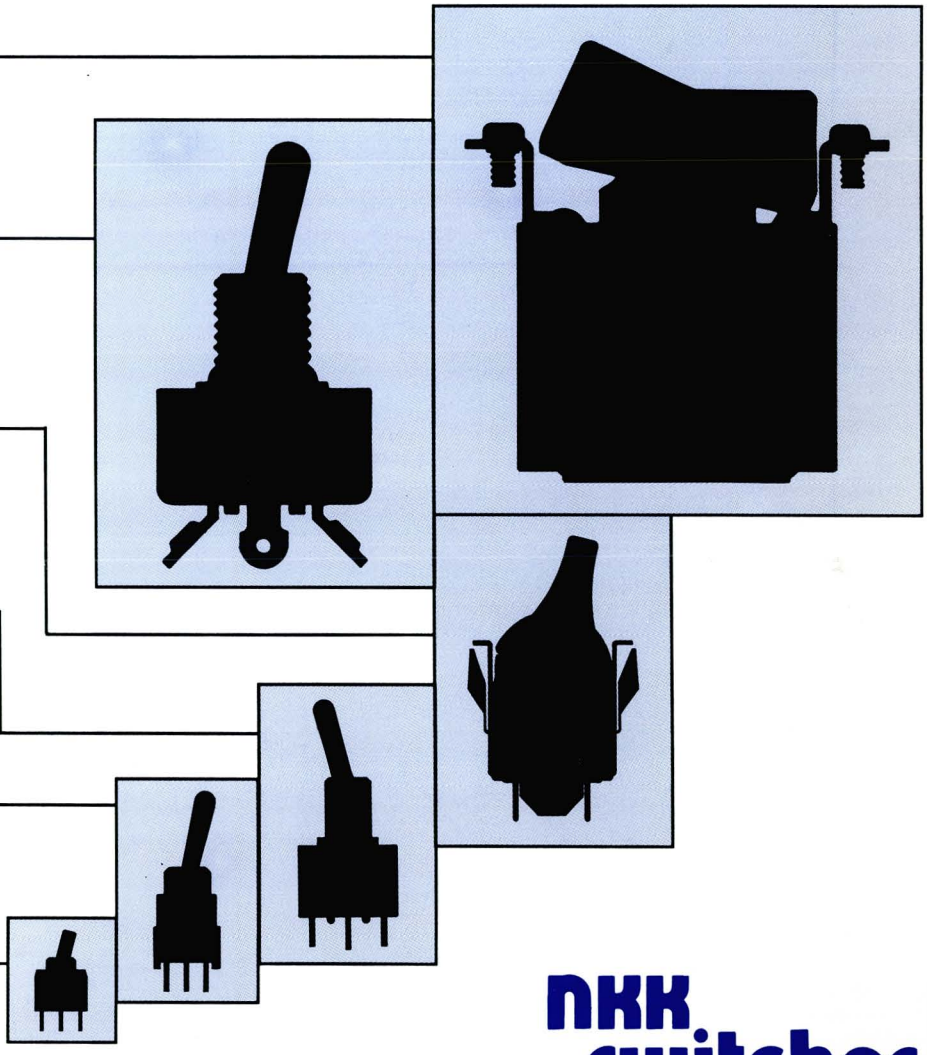
STANDARD
DLB LB SB TL
HS LW SCB TS
JP P SDB YB
JW S SW

MINIATURE
KB MR UB
MLW PW

SUBMINIATURE
E M M2100 MS
EB M2B MB2000 SB
JB M2T MB2400 SK
JF MR

SUPER-SUBMINIATURE
A AS BB FB
AB B DR HB

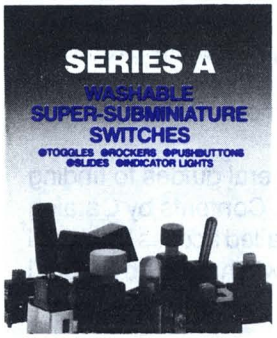
MICRO-SUBMINIATURE
G GB ND SS
G3 ND3



Catalog No. 9104 November 1991

nkk switches

CONTENTS BY PRODUCT SEQUENCE



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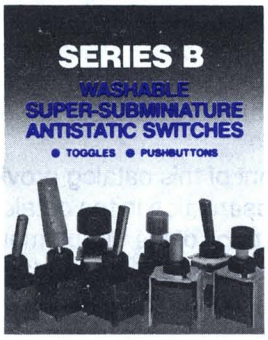

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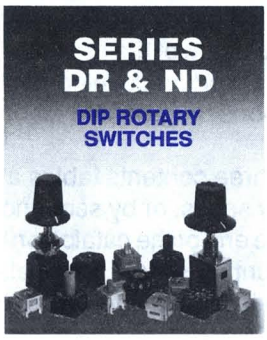

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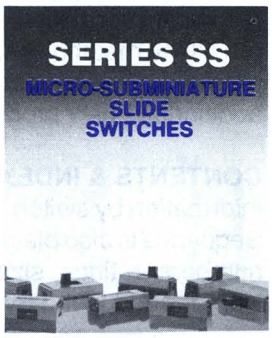

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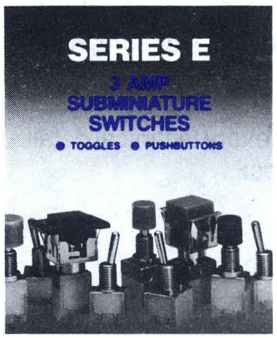

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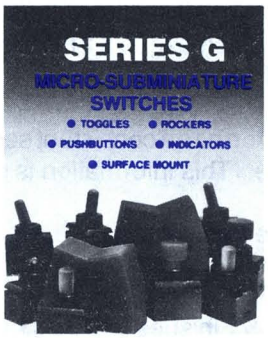

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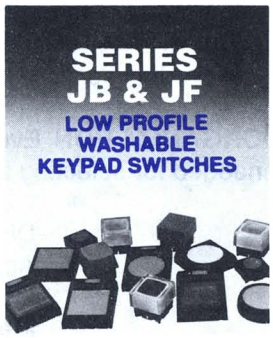

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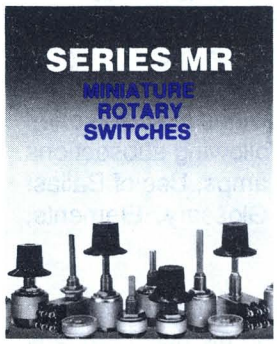

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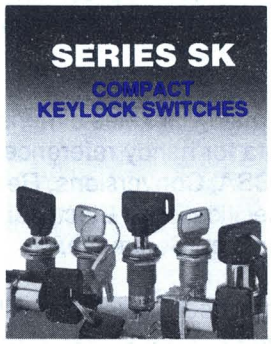

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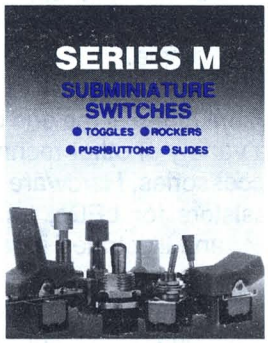

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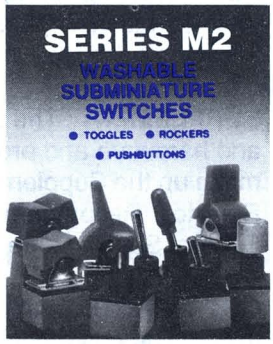

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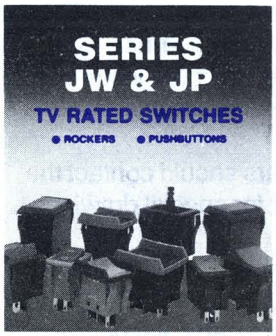

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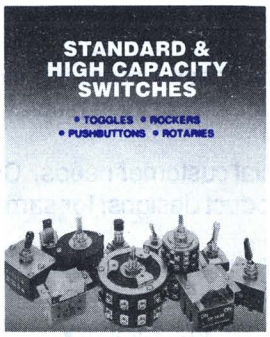

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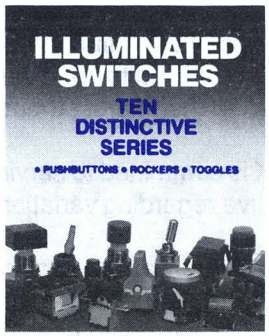

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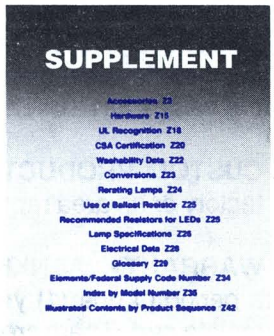

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ABOUT THIS DESIGN GUIDE

This engineering guide, like its predecessor Big Cat. 3rd edition, considers the user's need for complete, precise technical information along with handy ordering and reference details. Within the 440 pages of this Big Cat. are all the materials familiar to users of the previous Big Cat. and of the Standard and High Capacity Brochure, plus data on the most current product developments. Various refinements update the previous catalog with additions of new product options, augmented technical data and drawings, as well as improved layouts.

CONTENTS & INDEXES Three contents tables at the front of this catalog provide general guides to finding information by switch type, by series, or by sequence of presentation in the catalog. The Contents by Catalog Sequence is also placed at the end of the catalog on the last page of the Supplement. Detailed access by model numbers, ratings, sizes, mounting styles, terminals, and washability is found in the Switch Index by Model Number and in the Switch Selection Guide which follow the contents pages.

PAGING The sequence of the catalog sections is largely alphabetical by series. For example, Section A contains the A Series toggles, rockers, pushbuttons, slides, and indicators; and Section A is numbered A1 through A24. Section M contains the M Series toggle, rocker, pushbutton, and slide switches with pages numbered M1 through M90. Not all section letters correspond to the series letters. For instance, Section K contains the MR Series rotaries on pages K1 through K10. All categories of illuminated devices appear in the last product section, pages T1 through T112.

ORGANIZATION Every section has a consistent sequence of information to give the user every technical detail needed for selecting a device. This information is organized into the following categories:

Distinctive Features	Typical Ordering Example
Applications	Explanation of Codes & Options
General Specifications	Accessories
Materials & Finishes	Mounting Information
Details of Special Features	Dimension Drawings

ORDERING All the information necessary to make a complete part number is given on a single page in each typical ordering example. The ordering explanation is a simple, concise presentation of part number codes and their definitions. These definitions give an overview of the more detailed information found on the pages following each typical ordering example.

SUPPLEMENT The Supplement found at the end of the catalog includes dimension drawings of accessories and hardware and provides a variety of other technical data for handy reference. The following subsections make up the Supplement: Accessories, Hardware, UL & CSA, Conversions, Rerating Lamps, Use of Ballast Resistor, Recommended Resistors for LEDs, Lamp Specifications, Electrical Data, Glossary, Elements, Federal Supply Code Number, and Illustrated Index by Catalog Sequence.

CUT & PASTE DRAWINGS The dimension drawings have been developed with the user's convenience in mind. The customer can literally photocopy, cut, and paste a "do it yourself" drawing on his own company drawing format. Complete dimension drawings can be pieced together using all the drawings of actuators, bushings, and other variable parts which are sized to match the mechanical drawings at the end of each section. To complete the dimension drawings, the general specifications and pole and circuit charts can be added.

METRIC & INCH All drawings in this catalog have been dimensioned in English and metric units for the customer's convenience. The metric units are given in parentheses above the inch units. In some instances, the values have been rounded to the nearest thousandth for simplicity in displaying the dimension.

CUSTOM PRODUCTS NKK is committed to serving special customer needs. Customers should contact the factory or an area representative regarding variations in product designs, for samples, or for special drawings.

WARRANTY All NKK products are warranted against defects in workmanship, material and construction for a period of one (1) year from the date of shipment if the products have been properly installed, used, and maintained. There are no express warranties or warranties of merchantability or fitness for a particular purpose. Materials, finishes, and component parts are subject to change without notification.

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INDICATORS
A, G, HB, KB, LB,
MLW, UB, & YB Series

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SWITCH SELECTION GUIDE

NONILLUMINATED SWITCHES

MAX RATING	SIZE	MOUNTING				TERMINALS					WASH-ABLE	SERIES	PAGE
		PC Board	Bush-ing	Snap-in	Two Screw	Solder Lug	PC	Quick Connect	Wire-Wrap	Screw			
TOGGLES													
0.4VA @ 28V AC/DC	microsub	X					X				X	G	G1
0.4VA @ 28V AC/DC	supersub	X (Square Bushing)					X				X	A	A1
0.4VA @ 28V AC/DC	supersub	X (Round Antistatic Bush'g)					X				X	B	B1
0.4VA @ 28V AC/DC	submin	X	X			X	X	X	X			M	M1
0.4VA @ 28V AC/DC	submin	X					X		X		X	M2T	N1
3A @ 125V AC	submin	X	X			X	X					E	E1
6A @ 125V AC	submin	X	X			X	X	X	X			M	M1
6A @ 125V AC	submin	X					X		X		X	M2T	N1
10A @ 125V AC	standard	X	X			X	X	X				P	S4
25A @ 125V AC	standard		X			X		X		X		S Std	S7
30A @ 125V AC	std/hi cap		X							X		S Hi Cap	S16
30A @ 125V AC/DC	std/hi cap		X							X		S AC/DC	S16
ROCKERS													
0.4VA @ 28V AC/DC	microsub	X					X				X	G	G1
0.4VA @ 28V AC/D	supersub	X					X				X	A	A1
5A @ 125V AC	miniature			X		X						PW	M39
6A @ 125V AC	submin	X		X	X	X	X	X	X			M	M23
6A @ 125V AC	submin	X					X				X	M2T	N1
10A @ 125V AC	standard				X	X	X	X				P	S4
10A @ 125/250V AC	standard			X		X		X				JWM	JW1
16A @ 125/250V AC	standard			X		X		X				JWL	JW1
20A @ 125V AC	standard				X	X						SW Std	S20
30A @ 125V AC	std/hi cap				X					X		SW Hi Cap	S22
30A @ 125V AC/DC	std/hi cap				X					X		SW AC/DC	S22
PUSHBUTTONS													
0.4VA @ 28V AC/DC	microsub	X					X				X	GB	G6
0.4VA @ 28V AC/DC	supersub	X (Square Bushing)					X				X	AB	A15
0.4VA @ 28V AC/DC	supersub	X (Round Antistatic Bush'g)					X				X	BB	B9
0.4VA @ 28V AC/DC	supersub	X	X			X	X					FB	F6
0.4VA @ 28V AC/DC	submin	X					X				X	M2B	N12
0.4VA @ 28V AC/DC	submin	X	X	X		X	X	X	X			MB2000	M51
0.4VA @ 28V AC/DC	submin	X	X	X		X	X		X			MB2400	M69
500mA @ 125V AC	supersub	X	X			X	X					FB	F6
1A @ 125V AC	submin	X					X				X	M2B	N13
3A @ 125V AC	submin	X	X	X		X	X					EB	E8
3A @ 125V AC	submin	X	X	X		X	X					MB2400	M69
3A @ 125V AC	submin		X			X						SB4011	F1
6A @ 125V AC	submin	X	X	X		X	X	X	X			MB2000	M51
10A @ 125/250V AC	standard			X		X		X				JPM	JW1
15A @ 125V AC	standard		X			X		X		X		SCB	S29
15A @ 125V AC	standard			X	X	X						SDB	S27
16A @ 125/250V AC	standard			X		X		X				JPL	JW1
SLIDES													
0.4VA @ 28V AC/DC	supersub	X					X					AS	A19
0.4VA @ 28V AC/DC	submin	X			X	X	X		X			MS	M83
0.1A @ 30V DC	microsub	X					X					SS	C15
6A @ 125V AC	submin	X			X	X	X		X			MS	M83

SURFACE MOUNT DEVICES

MAX RATING	SIZE	ACTUATOR					SMD			WASH-ABLE	SERIES	PAGE
		Toggle	Pushb'tn	Slide	Rocker	Rotary	Butt	Gull Wing	J-Bend			
0.4VA @ 28V AC/DC	microsub	X	X					X		X	G3	G9
100mA @ 5/50V DC	microsub					X		X		X	ND3	C11

KEYPADS

MAX RATING	SIZE	MOUNTING	OPERATING FORCE	ILLUMINATION	SERIES	PAGE
50mA @ 24V DC	submin	PC Board	180 grams	Full Face Illumination or Nonillumination	JB	J1
50mA @ 24V DC	submin	PC Board	180 grams	Spot Illumination or Nonillumination	JF	J8
125mA @ 24V DC	submin	PC Board	270 grams	Full Face Illumination or Nonillumination	JB	J1

microsub = micro-subminiature supersub = super-subminiature submin = subminiature hi cap = high capacity

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SWITCH SELECTION GUIDE

ILLUMINATED SWITCHES

MAX RATING	SIZE	MOUNTING				TERMINALS					WASH-ABLE	SERIES	PAGE
		PC Board	Bush-ing	Snap-in	Two Screw	Solder Lug	PC	Quick Connect	Wire-Wrap	Screw			
TOGGLES													
0.4VA @ 28V AC/DC	submin	X	X	X	X	X	X	X				M2100	T97
6A @ 125V AC	submin	X	X	X	X	X	X	X				M2100	T97
6A @ 125V AC	standard		X			X						TL	T109
ROCKERS													
0.4VA @ 28V AC/DC	submin	X	X	X	X	X	X	X				M2100	T97
5A @ 125V AC	miniature			X		X						MLW	T79
6A @ 125V AC	submin	X	X	X	X	X	X	X				M2100	T97
10A @ 125V AC	standard			X		X						LW	T89
20A @ 125V AC	std/hi cap				X	X						LW	T95
PUSHBUTTONS													
0.4VA @ 28V AC/DC	miniature	X	X	X		X	X					KB	T19
0.4VA @ 28V AC/DC	standard	X	X	X		X	X					DLB	T71
0.4VA @ 28V AC/DC	standard	X	X	X		X	X	X				LB	T51
0.4VA @ 28V AC/DC	miniature	X		X		X	X					UB	T13
0.4VA @ 28V AC/DC	standard		X	X		X		X			X	YB	T35
0.1A @ 30V AC	supersub		X			X						HB	T3
1A @ 125V AC	miniature	X	X	X		X	X					KB	T19
3A @ 125/250V AC	standard	X	X	X		X	X	X				LB	T51
3A @ 125/250V AC	standard		X	X		X		X			X	YB	T35
5A @ 125V AC	standard	X	X	X		X	X					DLB	T71
5A @ 125/250V AC	miniature	X		X		X	X					UB	T13
SLIDES													
0.1A @ 30V DC	microsub	X					X					SS	C15

ROTARIES

MAX RATING	SIZE	MOUNTING		INDEXING	TERMINALS			WASH-ABLE	SERIES	PAGE
		PC Board	Bushing	(Step Size)	Solder Lug	PC	Screw			
0.4VA @ 28V AC/DC	miniature	X		30°		X		X	MRF	K1
0.4VA @ 28V AC/DC	miniature	X	X	30°		X		X	MRK	K1
0.4VA @ 28V AC/DC	miniature	X		45° & 90°		X		X	MRB	K11
100mA @ 5V DC	supersub	X		30° & 36°		X			DR	C1
100mA @ 5/50V DC	microsub	X		30° & 36°		X		X	ND	C7
250mA @ 125V AC	miniature	X	X	30°		X		X	MRA	K1
250mA @ 48V DC	miniature	X	X	30°		X		X	MRA	K1
1A @ 30V DC	miniature		X	45°	Turret				MRX	K8
2A @ 125V AC	miniature		X	45°	Turret				MRX	K8
2A @ 30V DC	miniature		X	60°	Turret				MRY	K8
3A @ 125V AC	miniature		X	60°	Turret				MRY	K8
4A @ 30V DC	miniature		X	120°	X				MRT	K8
6A @ 125/250V AC	submin		X	30°			X		TS	S35
10A @ 125V AC	miniature		X	120°	X				MRT	K8
12A @ 125V AC	supersub		X	45°				X	HS13	S33
12A @ 125V AC	supersub		X	30°				X	HS16	S32
30A @ 125/250V AC	std/hi cap		X	30°				X	PS	S34

KEYLOCKS

MAX RATING	SIZE	MOUNTING	INDEXING	TERMINALS	POSITIONS	WASHABLE	SERIES	PAGE
0.4VA @ 28V AC/DC	submin	PC Board	45°	PC	3	X	SK	L8
0.4VA @ 28V AC/DC	submin	PC Board	90°	PC	2	X	SK	L8
3A @ 125V AC	submin	Bushing	45°	Solder Lug	3	X	SK	L1
3A @ 125V AC	submin	Bushing	90°	Solder Lug	2	X	SK	L1

microsub = micro-subminiature submin = subminiature supersub = super-subminiature high cap = high capacity

NOTES

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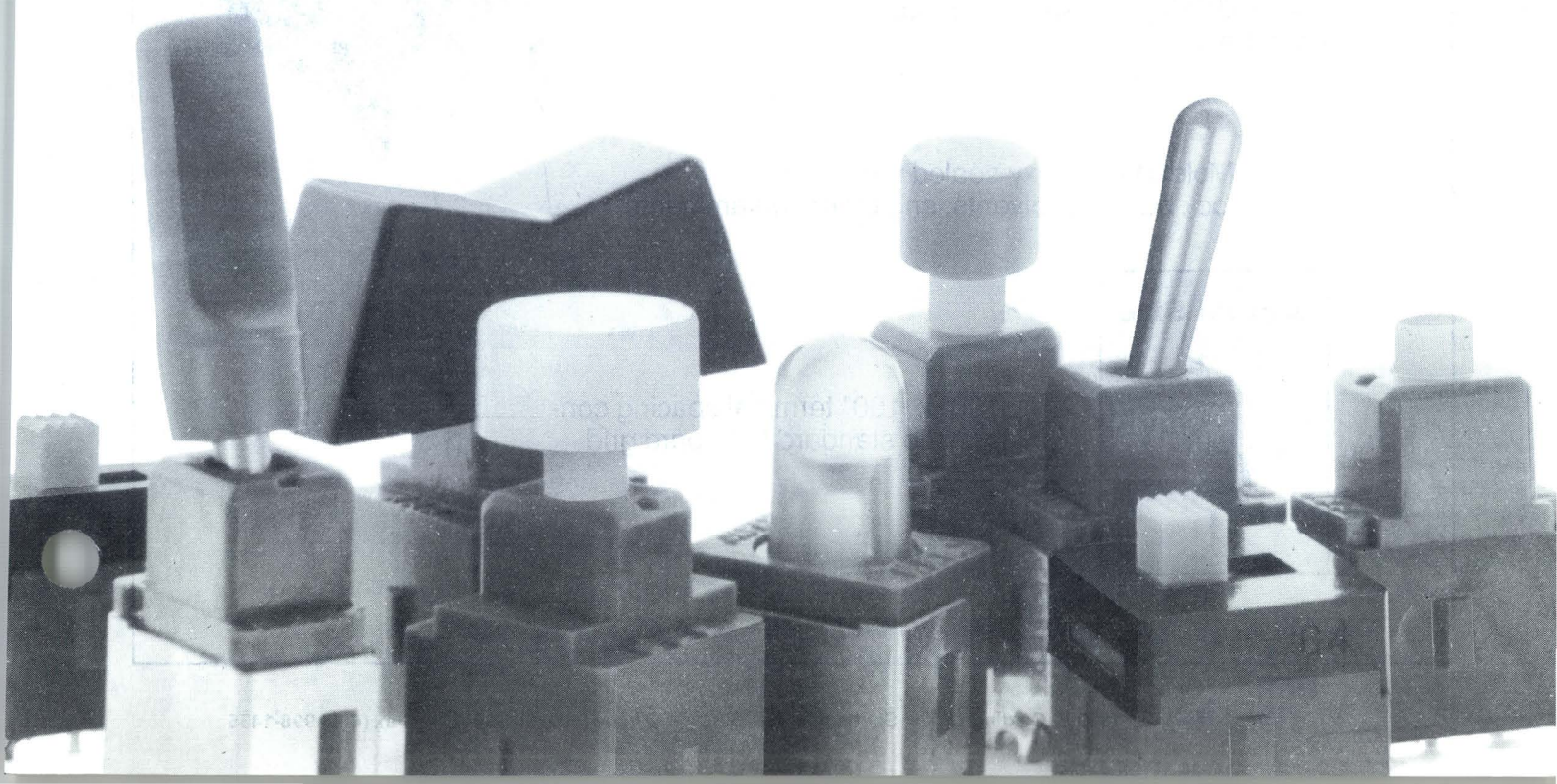
SERIES A

WASHABLE SUPER-SUBMINIATURE SWITCHES

●TOGGLES ●ROCKERS ●PUSHBUTTONS
●SLIDES ●INDICATOR LIGHTS



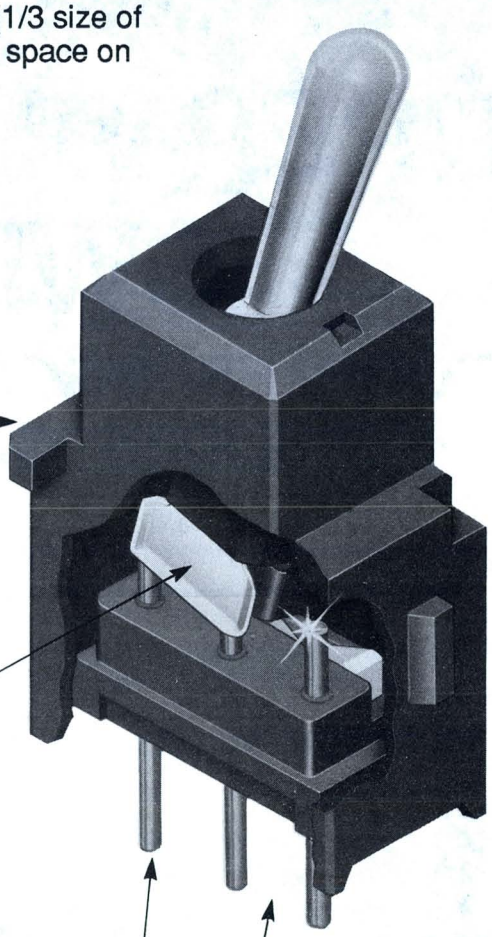
NKK SERIES A

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

DISTINCTIVE FEATURES

World's first to be approved by International Electrotechnical Commission's Quality Assessment System

Super-subminiature size (1/3 size of Series M switches) saves space on PC boards.



Totally sealed body prevents contact contamination, allows time- and money-saving automated wave soldering and washing.

Patented Sliding Twin Crossbar (STC) mechanism provides unequalled logic-level reliability and smoother, positive detent actuation.

Molded-in, epoxy sealed terminals lock out flux, solvents, and other contaminants.

Actual Size

.100" x .100" terminal spacing conforms to standard PC board grid spacing.

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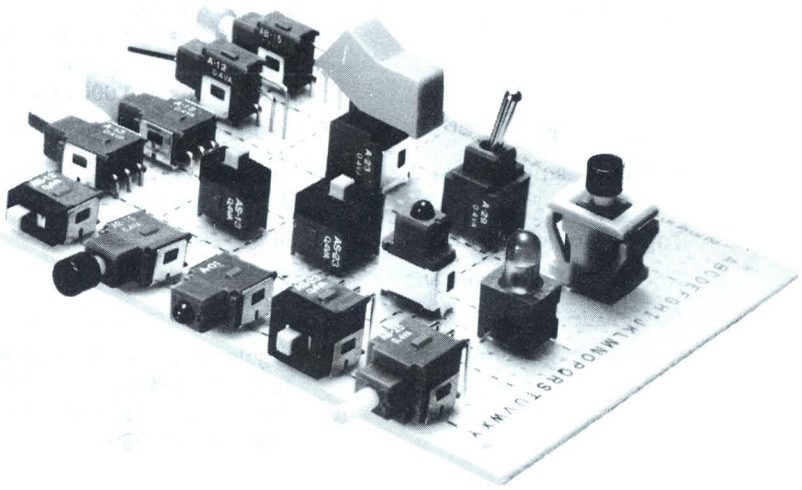
NKK SERIES A

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

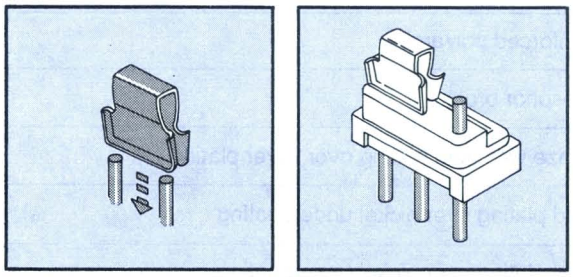
APPLICATIONS

- Toggles
- Rockers
- Pushbuttons
- Slides
- LED Indicator Lights

Tiny, PC mountable Series A washable switches are recommended for use in products where reliability is essential and space is restricted. Typical applications include computers, peripherals, communication systems, medical equipment, home videos, cameras and small measuring instruments.



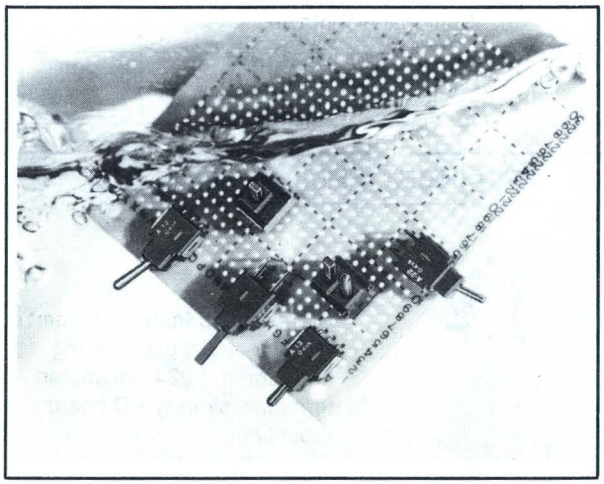
STC CONTACT MECHANISM



NKK's patented, award-winning STC contact mechanism offers benefits unavailable in conventional mechanisms. For example, movable twin contact surfaces pinch the stationary contacts to provide increased contact stability and unparalleled logic-level reliability. Continued reliability is assured since the gold-plated contacts are wiped clean with each actuation. Furthermore, if one side of the twin contacts should fail to conduct, the other side functions as a backup, or fail-safe path for the current. The 3-on models have shorting contacts, and all other circuits have nonshorting contacts. The combination of rounded movable and stationary contacts provides smooth contact feel previously unavailable in sliding contact type mechanisms.

SEALED FOR WASHABILITY

Sealed-body construction permits Series A switches to be subjected to time- and money-saving automated soldering techniques. As a result, they can be safely cleaned of flux without fear of compromising operating characteristics.



NKK SERIES A SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

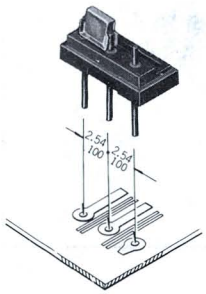
GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	50 milliohms maximum
Insulation Resistance:	500 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	Toggles & Rockers: 100,000 operations minimum for ON-NONE-ON & ON-OFF-ON 50,000 operations minimum for other circuits Pushbuttons: 50,000 operations minimum
Electrical Life:	50,000 operations minimum
Ambient Temp Range:	-10ºC through +85ºC (+14ºF through +185ºF) Optional low temperature lubricant available
Toggle Angle of Throw:	26°
Rocker Angle of Throw:	26°
Pushbutton Travel:	Pretravel 0.7mm (.028") Overtravel 0.4mm (.016") Total 1.1mm (.043")
Nominal Operating Force:	Toggles A & E & K w/Long Paddle: 150g (momentary); 120g (maintained) Toggles J & H & K w/Short Paddle: 278g (momentary); 188g (maintained) Rockers w/Actuators K & K1: 253g (momentary); 206g (maintained) Pushbuttons: 260g

MATERIALS & FINISHES

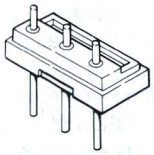
Toggle/Rocker Actuator	Nickel plated brass
Pushbutton Plunger	Polyacetal
Case Housing	Fiberglass reinforced polyamide
Support Bracket	Tin plated phosphor bronze
Movable Contact	Phosphor bronze with gold plating over silver plating
Stationary Contacts	Brass with gold plating over nickel undercoating
Terminals	Brass with gold plating over nickel undercoating

.100 INCH TERMINAL SPACING



Standard 2.54mm x 2.54mm (.100" x .100") grid spacing and 0.6mm (.024") diameter terminals simplify PC board mounting.

MOLDED-IN TERMINALS



Terminals are molded in the base and epoxy sealed to prevent flux, solvents, and other contaminants from reaching the contacts.

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NKK SERIES A TOGGLE SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

A 1 2 A H - G C

POLES	
1	SPST SPDT
2	DPDT SP3T

CIRCUITS			
1	OFF	NONE	ON
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
R	(ON)	NONE	ON
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
S	(ON)	OFF	ON
4	ON	ON	ON
6	(ON)	ON	(ON)
7	ON	ON	(ON)
( ) = Momentary			

PC TERMINALS	
Standard Length:	
P	Straight
B	Straight w/Bracket
B1	Straight w/Inline Bracket (SP only)
H	Right Angle w/Bracket
V	Vertical w/Bracket
V1	Vertical w/Inline Bracket (SP only)
Long Length:	
W	Straight
D	Straight w/Bracket
R	Right Angle w/ Bracket
X	Right Angle w/Long Bracket
T	Vertical w/Bracket
Y	.303" Right Angle w/Long Bracket
Z	.303" Extended R. Angle w/Long Brkt

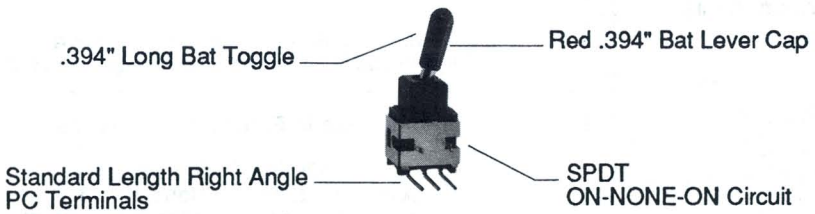
TOGGLES	
A	.394" Bat
E	.394" Flatted
H	.248" Flatted
J	.248" Bat
K	Snap Top for A or B Paddle

PADDLES	
A	Short Paddle for K Toggle
B	Long Paddle for K Toggle
OPTIONAL CAPS	
G	.394" Bat Lever Cap
J	.248" Bat Lever Cap

CAP COLORS		PADDLE COLORS
A	Black	A
B	White	B
C	Red	C
---	Yellow	E
---	Green	F
---	Blue	G
---	Gray	H

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (A12AH-GC)

SERIES A TOGGLE



NKK SERIES A TOGGLE SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

POLES AND CIRCUITS

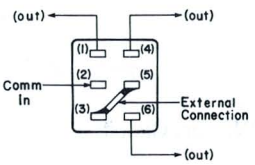
POLE & THROW	MODEL	TOGGLE POSITION & TERMINAL NUMBERS (Momentary) Up (Slot)	Center	Down
SPST	A11	OFF	NONE	ON
CONNECTED TERMINALS		OPEN	OPEN	3-1
SCHEMATIC			1 • • 3 INTERNAL CONNECTION	
SPDT	A12	ON	NONE	ON
	A13	ON	OFF	ON
	A15	ON	NONE	(ON)
	A1R	(ON)	NONE	ON
	A18	(ON)	OFF	(ON)
	A19	ON	OFF	(ON)
	A1S	(ON)	OFF	ON
CONNECTED TERMINALS		2-3	OPEN	2-1
SCHEMATIC			1 • • 2 (COMM) • 3	
DPDT	A22	ON	NONE	ON
	A23	ON	OFF	ON
	A25	ON	NONE	(ON)
	A2R	(ON)	NONE	ON
	A28	(ON)	OFF	(ON)
	A29	ON	OFF	(ON)
	A2S	(ON)	OFF	ON
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4
SCHEMATIC			1 • • 2 (COMM) 5 • • 3 4 • • 6	
SP3T	A24	ON	ON	ON
	A26	(ON)	ON	(ON)
	A27	ON	ON	(ON)
CONNECTED TERMINALS W/O EXTRA CONNECTIONS		2-3 5-6	2-3 5-4	2-1 5-4
SCHEMATICS W/EXTERNAL CONNECTIONS		External Connection 2(in) 5 1(out) 3 4(out) 6(out)	External Connection 2(in) 5 1(out) 3 4(out) 6(out)	External Connection 2(in) 5 1(out) 3 4(out) 6(out)

Terminal numbers are not actually on the switch.

THREE-ON POSITIONS

In the manufacture of the A24, A26, and A27 models, a double pole double throw switch is converted to a single pole with 3 independent circuits. **The extra connection shown in the diagram must be made during field installation.** Note that terminal numbers are not actually indicated on the switch.

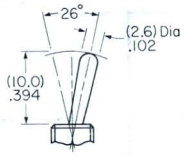
These 3-on models have shorting contacts.



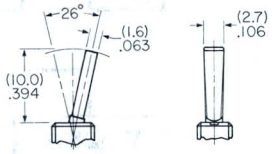
TOGGLES

Standard Finish: Bright Nickel Optional Finish: Black

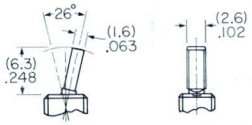
A .394" Bat



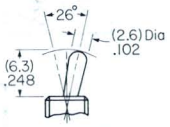
E .394" Flatted



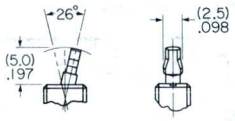
H .248" Flatted



J .248" Bat



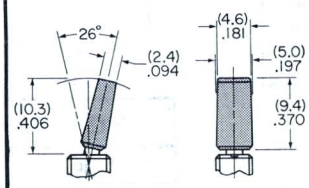
K Snap Top for Paddles



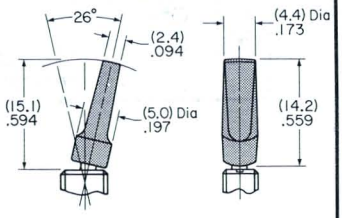
Note: Rocker actuators are shown in the rocker section.

PADDLES & OPTIONAL CAPS

A AT467 Short Paddle

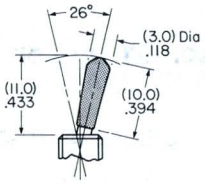


B AT468 Long Paddle

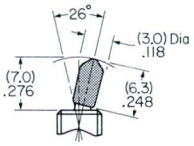


Paddle Material: Nylon
Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

G AT4003 .394" Bat Lever Cap



J AT4064 .248" Bat Lever Cap



Lever Cap Material: Polyvinyl chloride
Colors Available: **A** Black **B** White **C** Red

Optional Snap-in Panel Mounts Available:

AT530 for Single Pole
AT531 for Single or Double Pole
See Accessories section in the Supplement at the end of this catalog.

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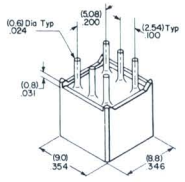
NKK SERIES A TOGGLE SWITCHES

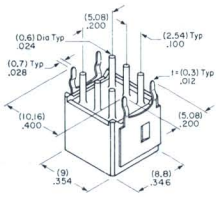
SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

STANDARD LENGTH PC TERMINALS

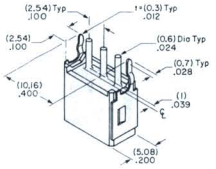
P
Straight



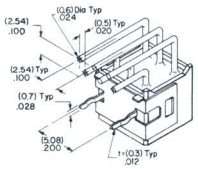
B
Straight with Bracket



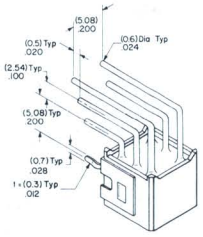
B1
Straight with Inline Bracket (SP only)



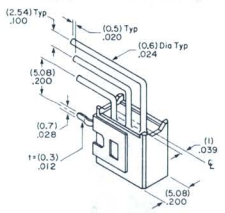
H
Right Angle with Bracket



V
Vertical with Bracket

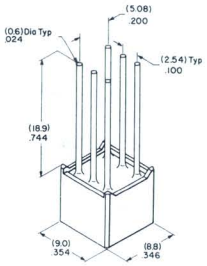


V1
Vertical with Inline Bracket (SP only)

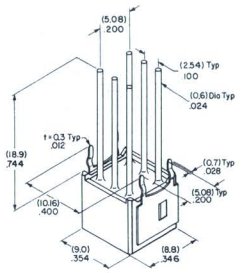


LONG LENGTH PC TERMINALS

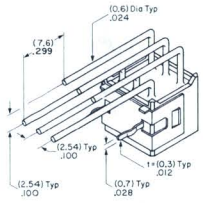
W
Straight



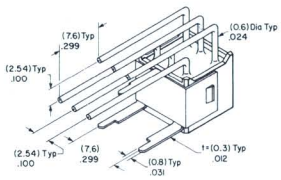
D
Straight with Bracket



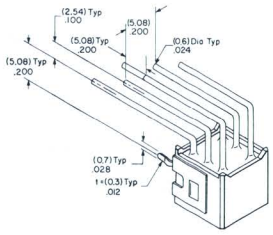
R
Right Angle with Bracket



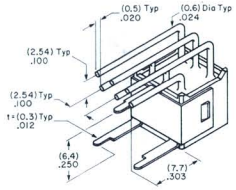
X
Right Angle with Long Bracket



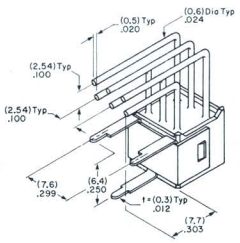
T
Vertical with Bracket



Y
.303" Right Angle with Long Bracket



Z
.303" Extended Right Angle with Long Bracket



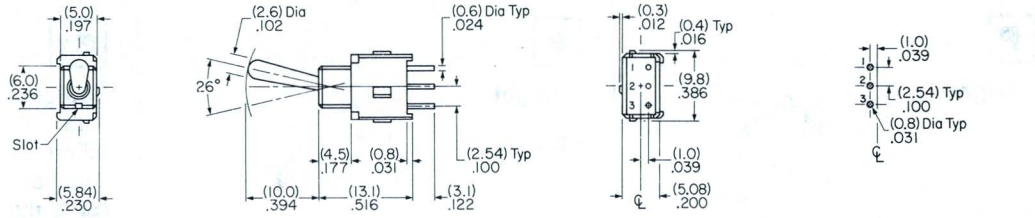
PCB MOUNTING AND SOLDERING CONSIDERATIONS

The use of a support bracket or placement of the square bushing in a panel cutout is recommended to increase PCB mounting stability. Soldering time and temperature limits are 3 seconds at 350°C or 5 seconds at 270°C.

NKK SERIES A TOGGLE SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

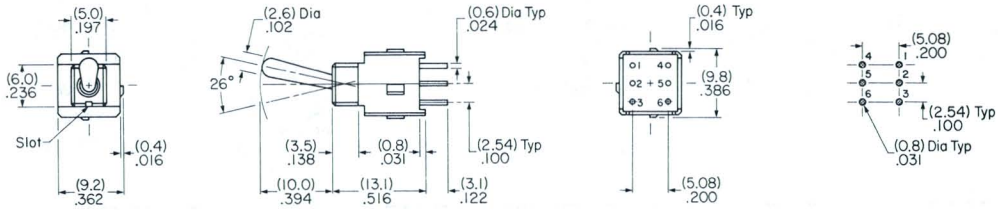
P Straight Terminals without Bracket/Single Pole



A12AP Model Shown

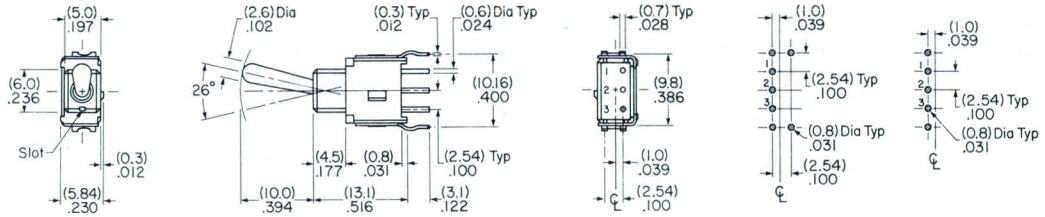
A11 models do not have terminal 2.

P Straight Terminals without Bracket/Double Pole



A22AP Model Shown

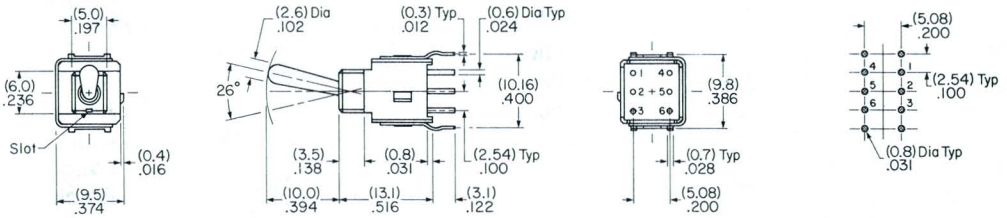
B B1 Straight Terminals with Bracket/Single Pole



A12AB Model Shown

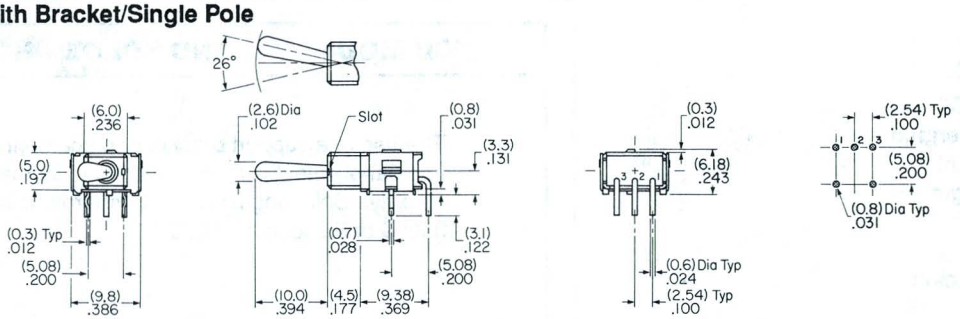
B Terminals B1 Terminals

B Straight Terminals with Bracket/Double Pole



A22AB Model Shown

H Right Angle Terminals with Bracket/Single Pole



A12AH Model Shown

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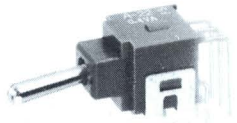
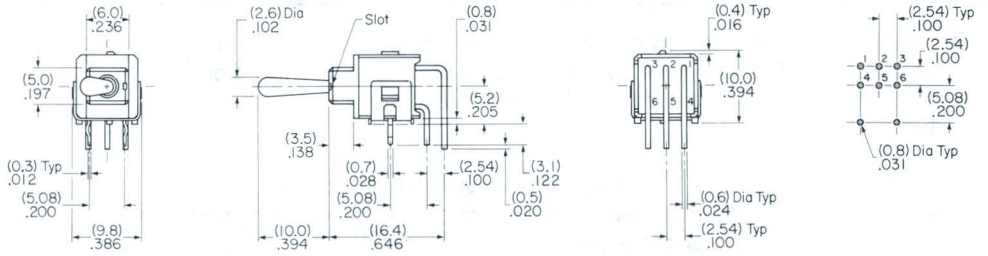
NKK SERIES A TOGGLE SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

H Right Angle Terminals with Bracket/Double Pole

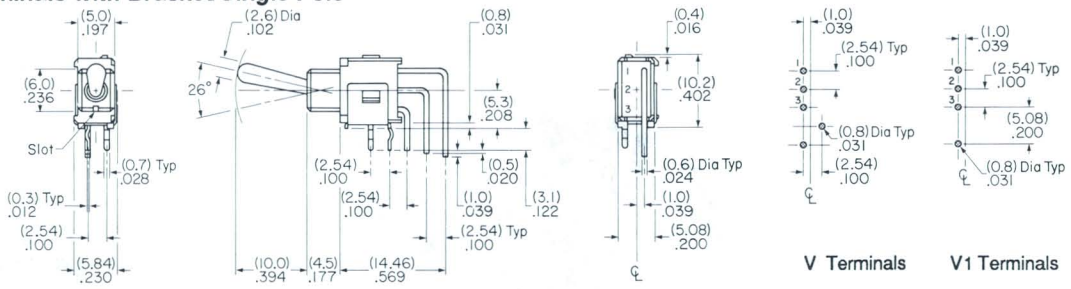


A22AH Model Shown



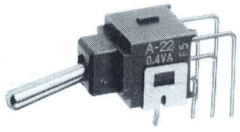
V V1 Vertical Terminals with Bracket/Single Pole

A12AV Model Shown

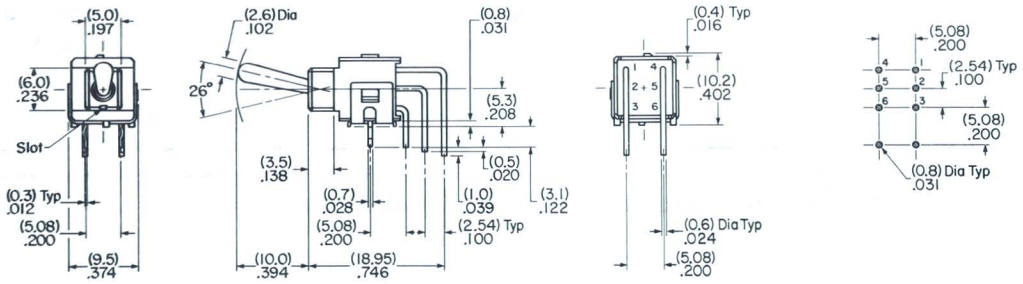


V Terminals V1 Terminals

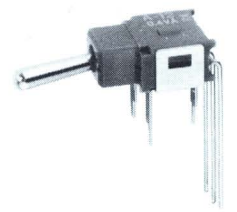
V Vertical Terminals with Bracket/Double Pole



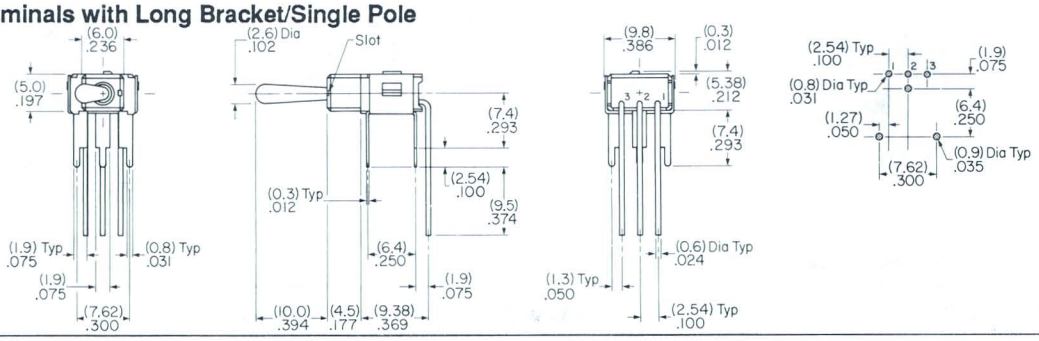
A22AV Model Shown



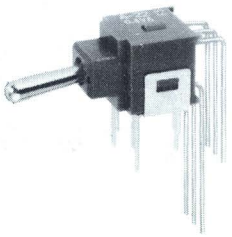
X Long Right Angle Terminals with Long Bracket/Single Pole



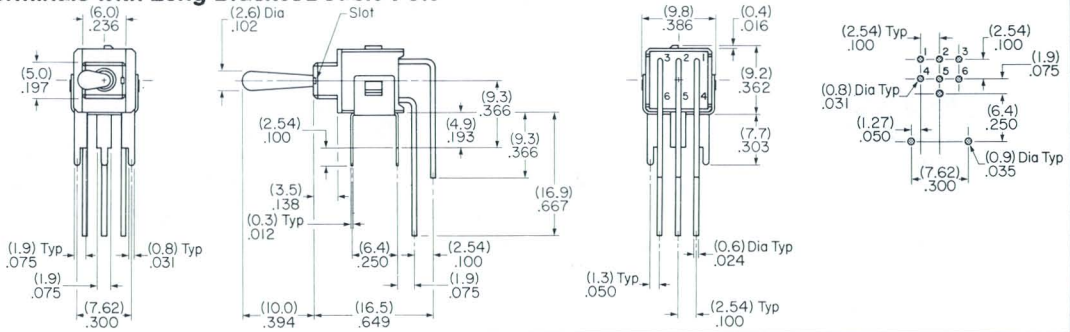
A12AX Model Shown



X Long Right Angle Terminals with Long Bracket/Double Pole



A22AX Model Shown



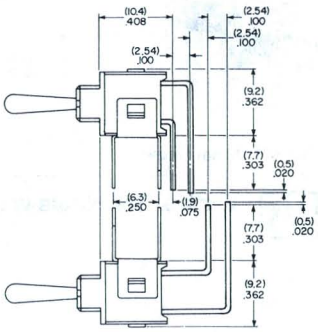
NKK SERIES A TOGGLE SWITCHES

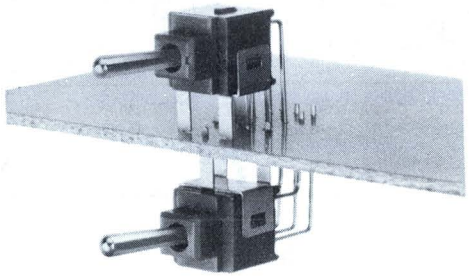
SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

SPECIAL INSTALLATION OF SWITCHES WITH Y AND Z TERMINALS

Terminals of the Y type are .150" longer than standard terminals. With these terminals the specially designed 3-legged support bracket is assembled on the switch having 2 legs near the top of the switch and the other leg near the bottom.

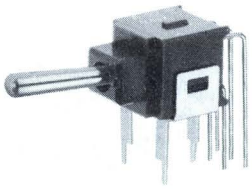
Terminals of the Z type are .150" longer than standard terminals and are extended .200" further from the base than is standard. With these terminals the specially designed, 3-legged support bracket is assembled on the switch having 1 leg near the top of the switch and the other 2 legs near the bottom.

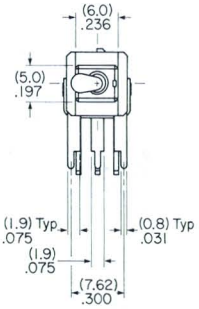


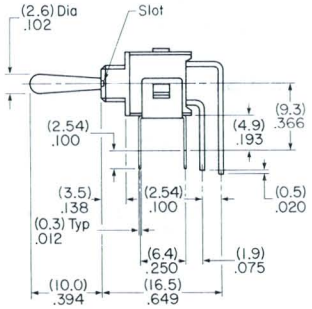


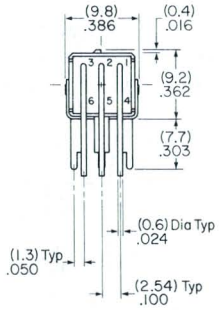
The reversed orientation of the 3-legged support brackets, along with the dimensions of terminal bends, allow the switches to be installed on opposite sides of the PC board.

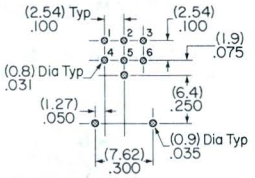
Y **.303" Right Angle Terminals with Long Bracket/Double Pole**





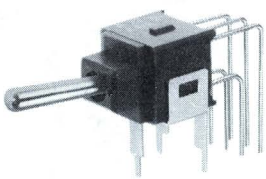


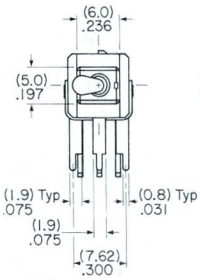


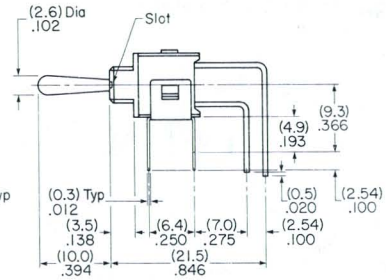


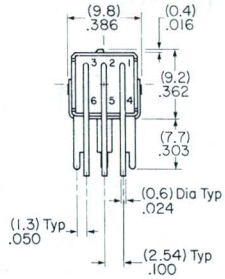
A22AY Model Shown

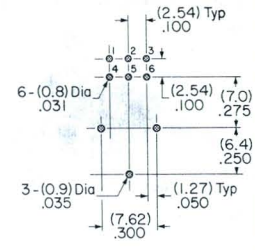
Z **.303" Extended Right Angle Terminals with Long Bracket/Double Pole**











A22AZ Model Shown

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NKK SERIES A ROCKER SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

A	2	9	K	V	-	C	C

POLES	
1	SPDT
2	DPDT SP3T

CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
R	(ON)	NONE	ON
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
S	(ON)	OFF	ON
4	ON	ON	ON
6	(ON)	ON	(ON)
7	ON	ON	(ON)
( ) = Momentary			

PC TERMINALS	
P	Straight
B	Straight w/Bracket
B1	Straight w/Inline Bracket (SP only)
H	Right Angle w/Bracket
V	Vertical w/Bracket
V1	Vertical w/Inline Bracket (SP only)

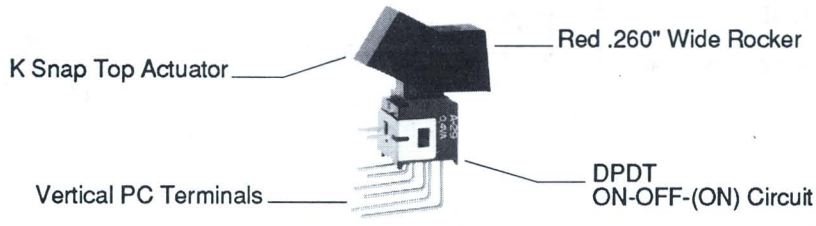
ACTUATORS	
K	Snap Top for Rocker AT469
K1	Snap Top for Rockers AT062 & AT066

ROCKERS	
C	.260" Wide
D	.250" Wide
E	.300" Wide

COLORS	
A	Black
B	White
C	Red

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (A29KV-CC)

SERIES A ROCKER

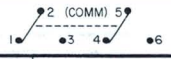
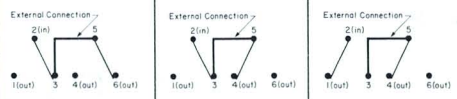


Electrical Capacity: 0.4VA max. @ 28V AC/DC max.
(See page A4 for further general specifications.)

NKK SERIES A ROCKER SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

POLES AND CIRCUITS

POLE & THROW	MODEL	ROCKER POSITION & TERMINAL NUMBER (Momentary) Up (Slot)	Center	Down
SPDT	A12	ON	NONE	ON
	A13	ON	OFF	ON
	A15	ON	NONE	(ON)
	A1R	(ON)	NONE	ON
	A18	(ON)	OFF	(ON)
	A19	ON	OFF	(ON)
	A1S	(ON)	OFF	ON
CONNECTED TERMINALS		2-3	OPEN	2-1
SCHEMATIC				
DPDT	A22	ON	NONE	ON
	A23	ON	OFF	ON
	A25	ON	NONE	(ON)
	A2R	(ON)	NONE	ON
	A28	(ON)	OFF	(ON)
	A29	ON	OFF	(ON)
	A2S	(ON)	OFF	ON
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4
SCHEMATIC				
SP3T	A24	ON	ON	ON
	A26	(ON)	ON	(ON)
	A27	ON	ON	(ON)
CONNECTED TERMINALS W/O EXTRA CONNECTION		2-3 5-6	2-3 5-4	2-1 5-4
SCHEMATICS W/EXTERNAL CONNECTIONS				

Terminal numbers are not actually on switch. Additional 3-on info page A6.

PC TERMINALS

Gold Material Only
Rated 0.4VA max. @ 28V max. AC/DC

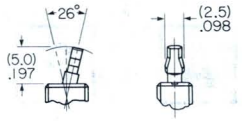
Dimensions for the following terminals appear on the rocker drawings in this section.

- **P** Straight
- **H** Right Angle
- **B** Straight w/Bracket
- **V** Vertical
- **B1** Straight w/Inline Brkt
- **V1** Vertical w/Inline Brkt

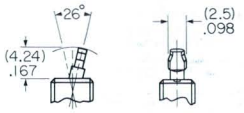
Dimensions for W, D, R, X, T, Y & Z long length terminals appear on page A7.

ACTUATORS

K Snap Top for Rocker AT469

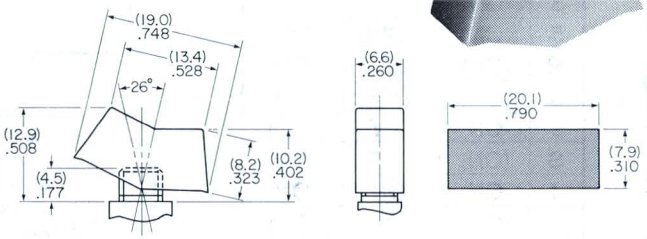


K1 Snap Top for Rockers AT062 and AT066

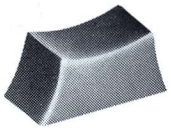


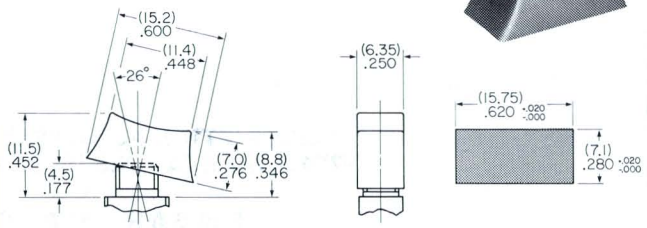
ROCKERS

C AT469 .260" Wide Rocker

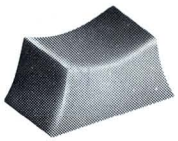


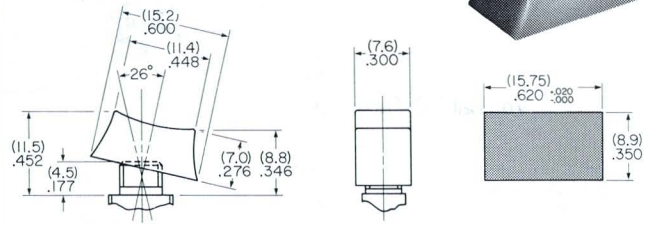
D AT062 .250" Wide Rocker





E AT066 .300" Wide Rocker





All Rockers are Antirotational
Material of Rockers: Nylon
Colors Available: **A** Black **B** White **C** Red
Contact factory for other colors.

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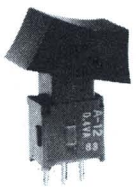
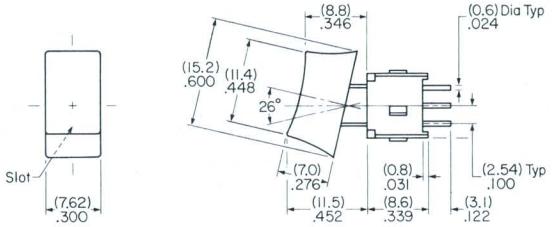
NKK SERIES A ROCKER SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

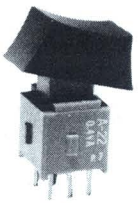
P Straight Terminals without Bracket/Single Pole

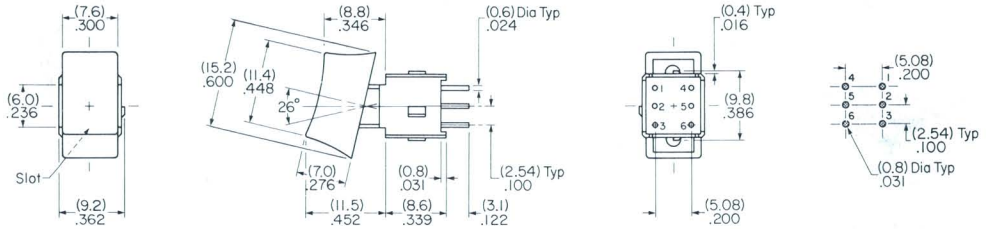




A12K1P-EA Model Shown

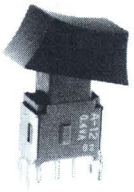
P Straight Terminals without Bracket/Double Pole

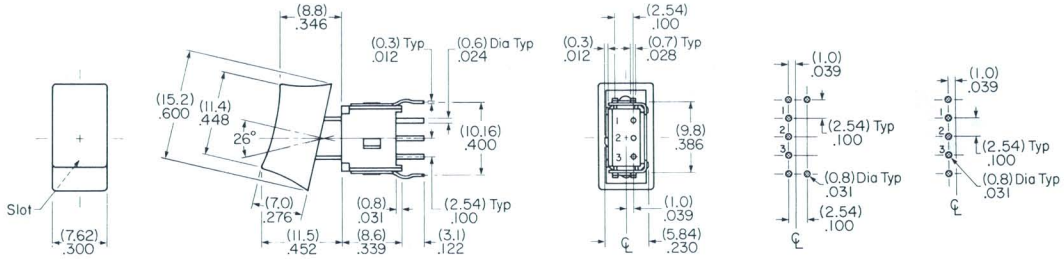




A22K1P-EA Model Shown

B B1 Straight Terminals with Bracket/Single Pole

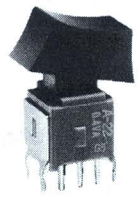


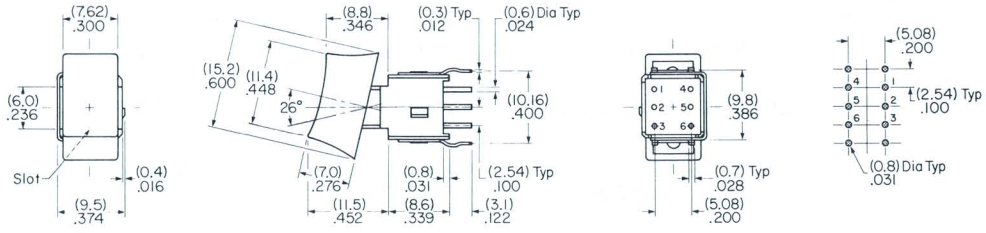


A12K1B-EA Model Shown

B Terminals B1Terminals

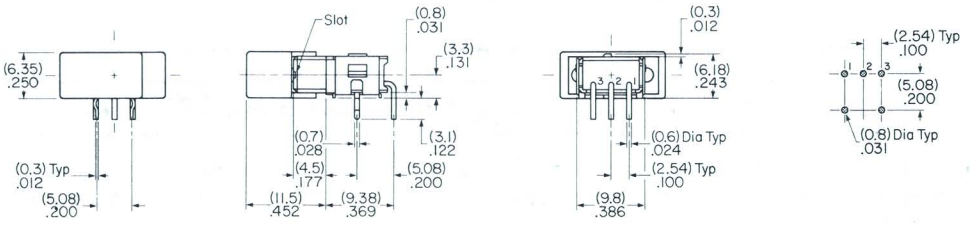
B Straight Terminals with Bracket/Double Pole





A22K1B-EA Model Shown

H Right Angle Terminals with Bracket/Single Pole



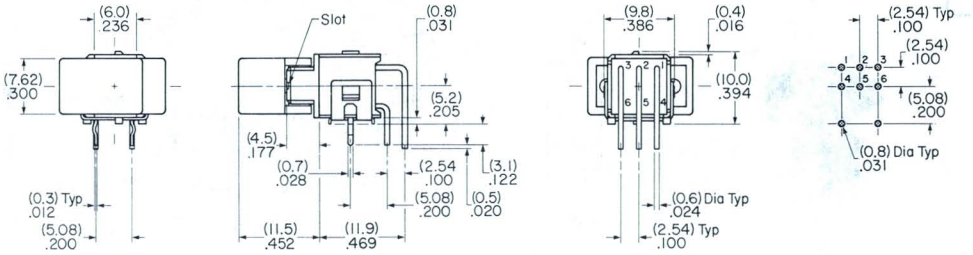
A12K1H-DA Model Shown

NKK SERIES A ROCKER SWITCHES

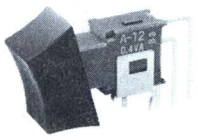
SUPER-SUBMINIATURE/PCB MOUNTING/WASHABLE

H Right Angle Terminals with Bracket/Double Pole

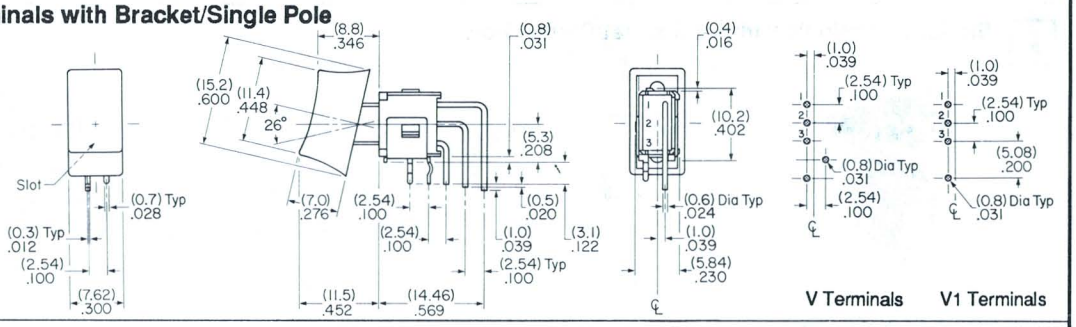
A22K1H-EA Model Shown



V V1 Vertical Terminals with Bracket/Single Pole

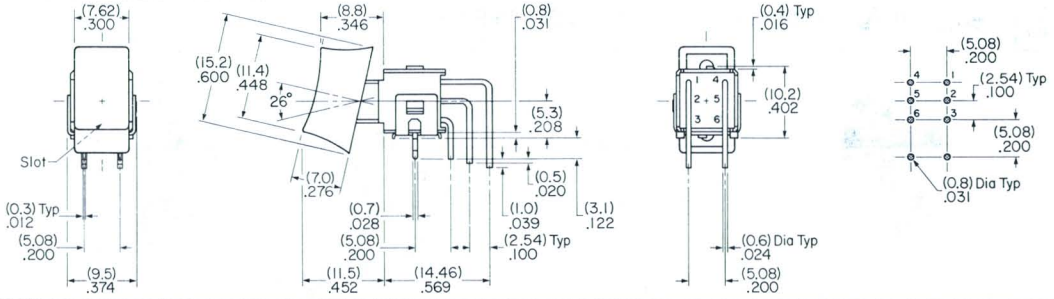


A12K1V-EA Model Shown



V Vertical Terminals with Bracket/Double Pole

A22K1V-EA Model Shown



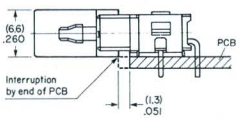
ROCKER MOUNTING PRECAUTION

Rocker switches with vertical and right angle terminals must be mounted so that extension of the PC board beyond the top of the switch housing does not interrupt rocker movement, in turn causing incomplete switching operation.

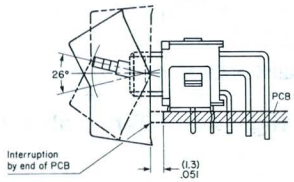
The MAXIMUM limit of the PC board extension is 1.3mm (.051"), as illustrated below.

This precaution does not apply to the double pole switch with right angle terminals due to the extra width of the switch allowing the rocker to clear the PC board.

End View of Rocker
Right Angle Mounting PC
Single Pole Only



Side View of Rocker
Vertical Mounting PC
Single and Double Pole



PCB MOUNTING AND SOLDERING CONSIDERATIONS

The use of a support bracket or placement of the square bushing in a panel cutout is recommended to increase PCB mounting stability.

Soldering time and temperature limits are 3 seconds at 350°C or 5 seconds at 270°C.

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NKK SERIES A PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/PCB/MOMENTARY/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

AB 2 5 A P - H A

POLES	
1	SPST SPDT
2	DPDT

CIRCUITS		
1	OFF	(ON)
5	ON	(ON)
( ) = Momentary		

PC TERMINALS	
P	Straight
B	Straight w/Bracket
B1	Straight w/Inline Bracket (SP only)
H	Right Angle w/Bracket
V	Vertical w/Bracket
V1	Vertical w/Inline Bracket (SP only)

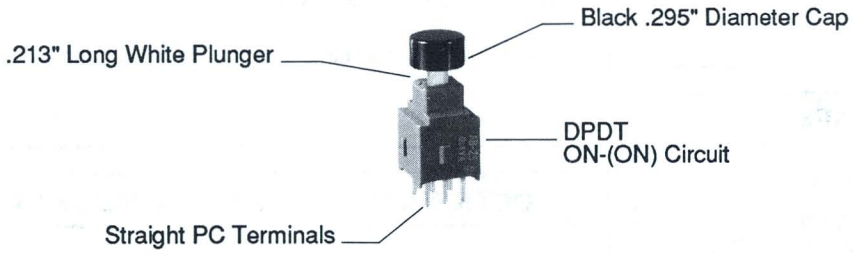
PLUNGERS	
A	.213" Long
*B	.183" Long
*C	.080" Long
* Available in single pole only.	

CAPS	
F	.201" Diameter
H	.295" Diameter

CAP COLORS	
A	Black
B	White
C	Red

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (AB25AP-HA)

SERIES AB PUSHBUTTON

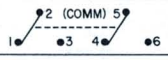


Electrical Capacity: 0.4VA max. @ 28V AC/DC max.
(See page A4 for further general specifications.)

NKK SERIES A PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/PCB/MOMENTARY/WASHABLE

POLES AND CIRCUITS

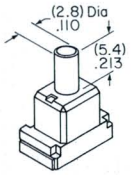
POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS (Momentary) Normal	Down
SPST	AB11	OFF	(ON)
CONNECTED TERMINALS		OPEN	3-1
SCHEMATIC			
SPDT	AB15	ON	(ON)
CONNECTED TERMINALS		2-3	2-1
SCHEMATIC			
DPDT	AB25	ON	(ON)
CONNECTED TERMINALS		2-3 5-6	2-1 5-4
SCHEMATIC			

Terminal numbers are not actually on the switch.

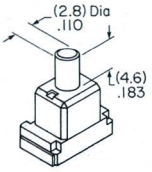
PLUNGERS

Standard color: White
For red & black options, contact factory.

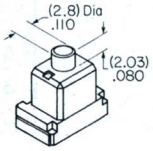
A **.213" Long**



B **.183" Long** (on SP only)



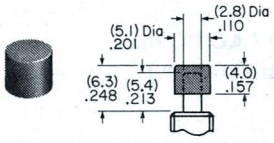
C **.080" Long** (on SP only)



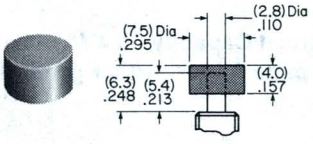
OPTIONAL SLIP-ON CAPS

For use with plungers A & B only.

F **AT475**
.201" Dia. Cap



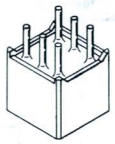
H **AT496**
.295" Dia. Cap



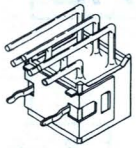
Material: Polycarbonate
Colors Available: **A** Black **B** White **C** Red

PC TERMINALS

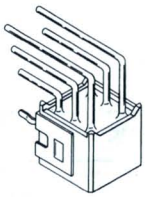
P&B **Straight**



H **Right Angle**



V **Vertical**



P, B, B1, H, V, & V1 terminal dimensions appear on the pushbutton drawings which follow.

W, D, R, X, T, Y & Z terminal dimensions appear on page A7.

PCB MOUNTING & SOLDERING

The use of a support bracket or placement of the square bushing in a panel cutout is recommended to increase PCB mounting stability.

Soldering time and temperature limits are 3 seconds at 350°C or 5 seconds at 270°C.

Freon or alcohol cleaning solvents are recommended.

OPTIONAL SNAP-IN PANEL MOUNTS

Optional Snap-in Panel Mounts Available:

AT530 for Single Pole
AT531 for Single & Double Pole

See Accessories section in the Supplement at the end of this catalog.

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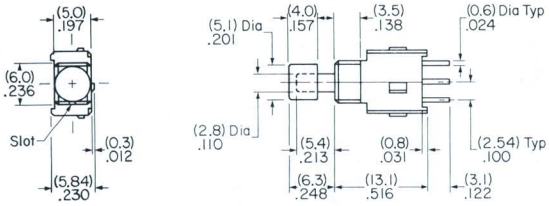
NKK SERIES A PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/PCB/MOMENTARY/WASHABLE

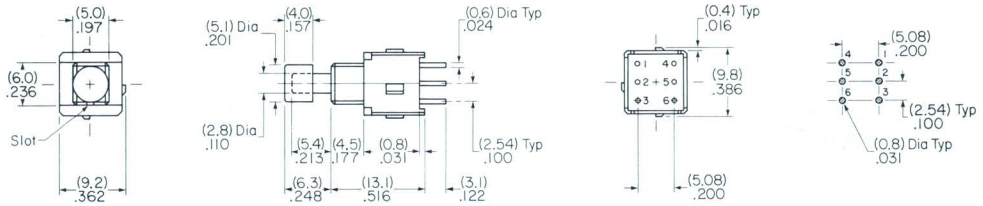
P Straight Terminals without Bracket/Single Pole



AB15AP-FA Model Shown

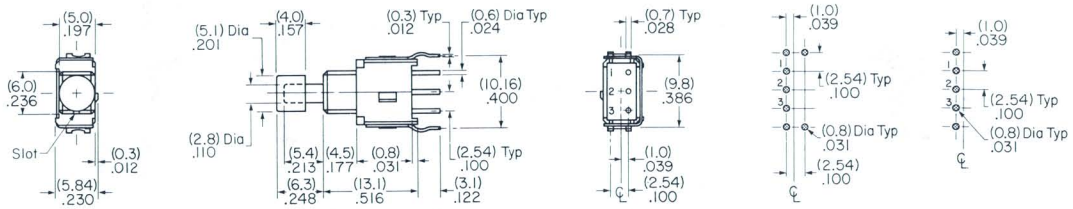
AB11 models do not have terminal 2.

P Straight Terminals without Bracket/Double Pole



AB25AP-FA Model Shown

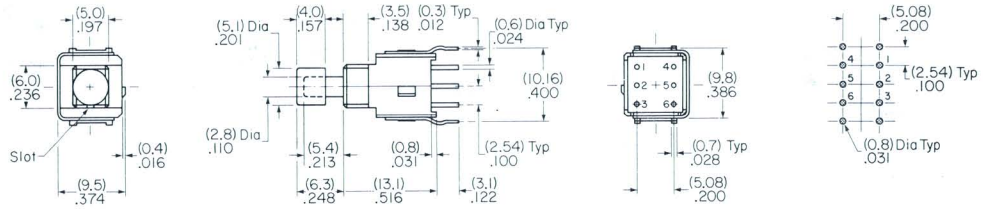
B B1 Straight Terminals with Bracket/Single Pole



AB15AB-FA Model Shown

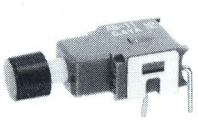
B Terminals B1 Terminals

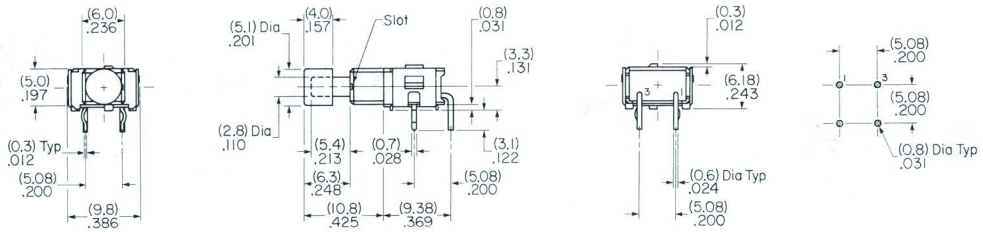
B Straight Terminals with Bracket/Double Pole



AB25AB-FA Model Shown

H Right Angle Terminals with Bracket/Single Pole (Single Throw)



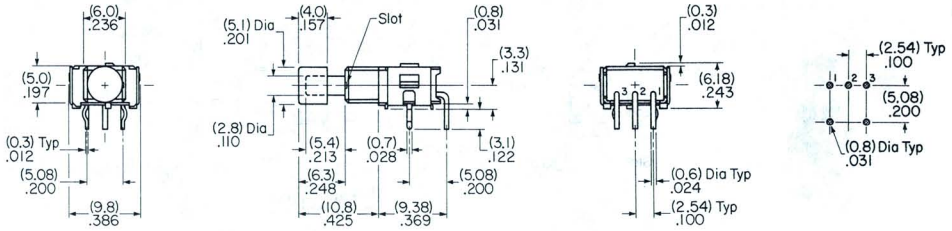


AB11AH-FA Model Shown

NKK SERIES A PUSHBUTTON SWITCHES

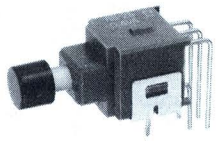
SUPER-SUBMINIATURE/PCB/MOMENTARY/WASHABLE

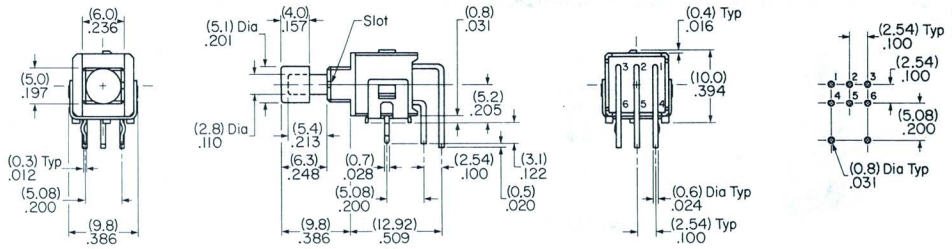
H Right Angle Terminals with Bracket/Single Pole (Double Throw)



AB15AH-FA Model Shown

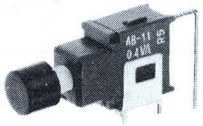
H Right Angle Terminals with Bracket/Double Pole

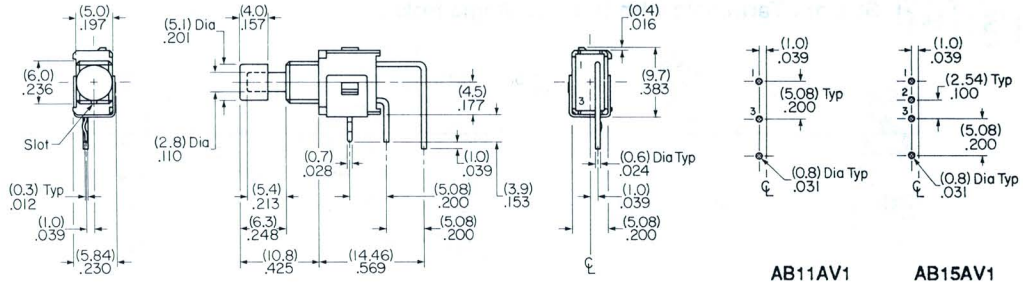




AB25AH-FA Model Shown

V1 Vertical Terminals with Inline Bracket/Single Pole (Single Throw)

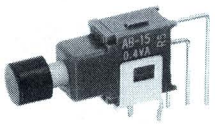


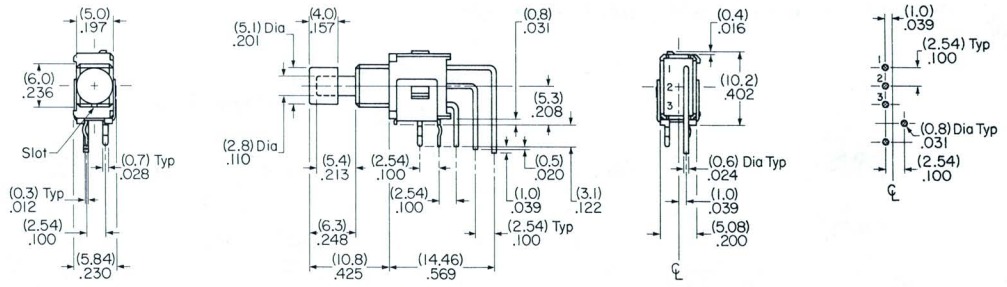


AB11AV1-FA Model Shown

AB11AV1 AB15AV1

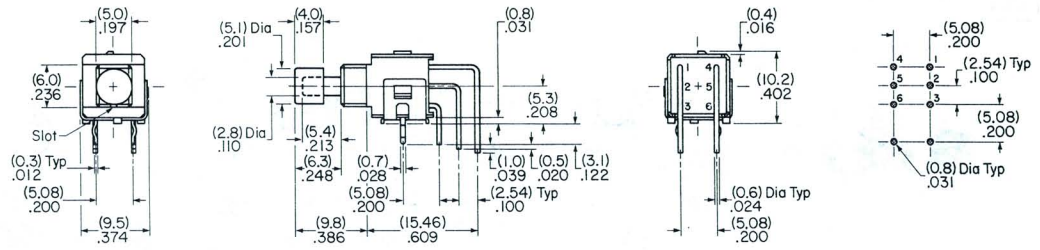
V Vertical Terminals with Bracket/Single Pole





AB15AV-FA Model Shown

V Vertical Terminals with Bracket/Double Pole



AB25AV-FA Model Shown

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NKK SERIES A SLIDE SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	50 milliohms maximum
Insulation Resistance:	500 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	50,000 operations minimum
Ambient Temp Range:	-10°C through +85°C (+14°F through +185°F)
Total Travel:	2.5mm (.098")
Nominal Operating Force:	260 grams

MATERIALS & FINISHES

Actuator	Fiberglass reinforced polyamide
Upper Case Housing	Carbon composite polyacetal
Lower Case Housing	Fiberglass reinforced polyamide
Support Bracket	Tin plated phosphor bronze
Movable Contact	Phosphor bronze with gold plating over silver plating
Stationary Contacts	Brass with gold plating over nickel undercoating
Terminals	Brass with gold plating over nickel undercoating

TYPICAL SWITCH ORDERING EXAMPLE

AS 2 3 A H

POLES

1	SPST SPDT
2	DPDT SP3T

CIRCUITS

1	ON	NONE	OFF
2	ON	NONE	ON
3	ON	OFF	ON
4	ON	ON	ON

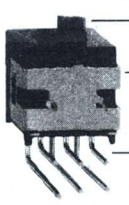
ACTUATORS

A	.098" Long
B	Flush
C	.150" Long (Single Pole Only)

PC TERMINALS

P	Straight
B	Straight w/Bracket
H	Right Angle w/Bracket
V	Vertical w/Bracket

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (AS23AH):



White .098" Long Actuator

DPDT
ON-OFF-ON Circuit

Right Angle PC Terminals

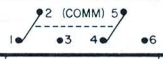
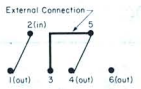
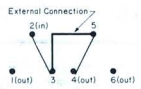
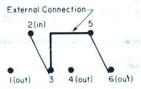
Note: The A Series slide switch is not washable.

Slides

NKK SERIES A SLIDE SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING

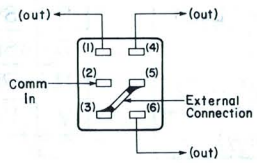
POLES AND CIRCUITS

POLE & THROW	MODEL	SLIDE POSITION & TERMINAL NUMBER (Momentary) Up	Center	Down
SPST	AS11	ON	NONE	OFF
CONNECTED TERMINALS		3-1	OPEN	OPEN
SCHEMATIC				
SPDT	AS12	ON	NONE	ON
	AS13	ON	OFF	ON
CONNECTED TERMINALS		2-1	OPEN	2-3
SCHEMATIC				
DPDT	AS22	ON	NONE	ON
	AS23	ON	OFF	ON
CONNECTED TERMINALS		2-1 5-4	OPEN	2-3 5-6
SCHEMATIC				
SP3T	AS24	ON	ON	ON
CONNECTED TERMINALS W/O EXTRA CONNECTION		2-1 5-4	2-3 5-4	2-3 5-6
SCHEMATICS W/EXTERNAL CONNECTIONS				

Terminal numbers are not actually on the switch. Contacts for AS24 are shorting; all other models are nonshorting.

THREE-ON POSITIONS

In the manufacture of the AS24 model, a double pole double throw switch is converted to a single pole with 3 independent circuits. The extra connection shown in the diagram must be made during field installation. Note that terminal numbers are not actually indicated on the switch.



PCB MOUNTING AND SOLDERING

The use of a support bracket is recommended to increase PCB mounting stability.

Soldering time & temperature limits:

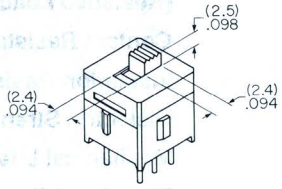
3 seconds at 350°C

5 seconds at 270°C

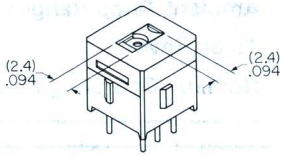
ACTUATORS

Actuator Color: White standard

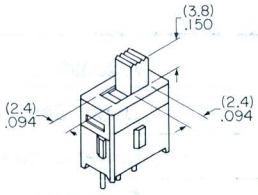
A **.098" Long**



B **Flush**



C **.150" Long**
(Single Pole Only)

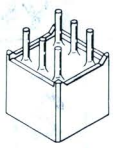


Note: To obtain information regarding other color options, contact the factory.

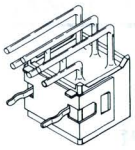
PC TERMINALS

P **Straight**

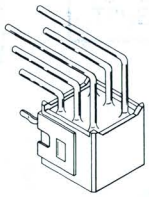
B **Straight w/Bracket**



H **Right Angle w/Bracket**



V **Vertical w/Bracket**



P, B, H & V terminal dimensions appear on the slide drawings which follow.

W, D, R, X, & T terminal dimensions appear in the toggle section.

Slides

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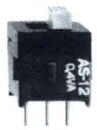
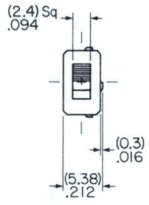
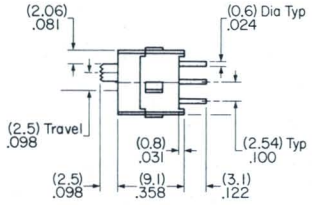
NKK SERIES A SLIDE SWITCHES

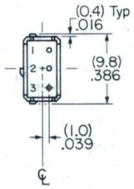
SUPER-SUBMINIATURE/PCB MOUNTING

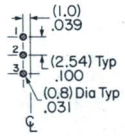
P Straight PC Terminals without Bracket/Single Pole





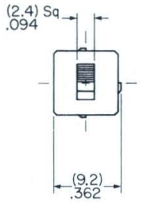


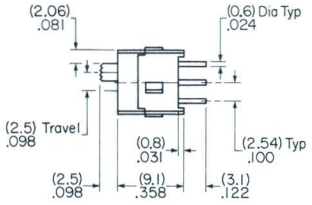


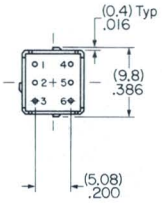


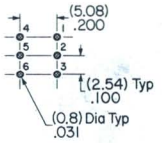
AS12AP Model Shown (Actuator shown in UP position.) Single throw models do not have terminal 2.

P Straight PC Terminals without Bracket/Double Pole



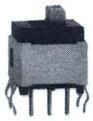


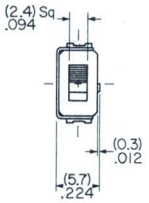


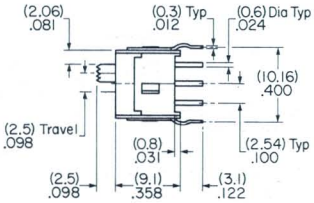


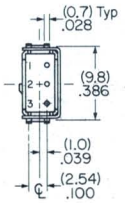
AS22AP Model Shown (Actuator shown in UP position.)

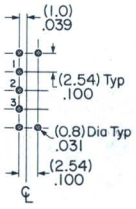
B Straight PC Terminals with Bracket/Single Pole





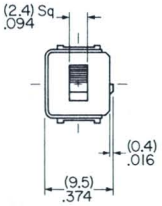


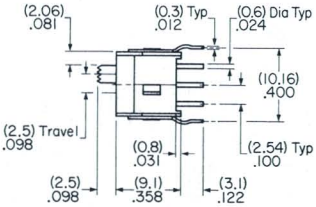


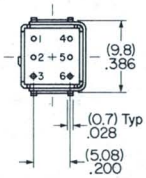


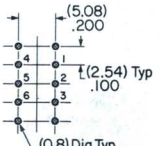
AS12AB Model Shown (Actuator shown in UP position.)

B Straignt PC Terminals with Bracket/Double Pole









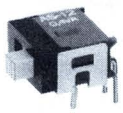
AS22AB Model Shown (Actuator shown in UP position.)

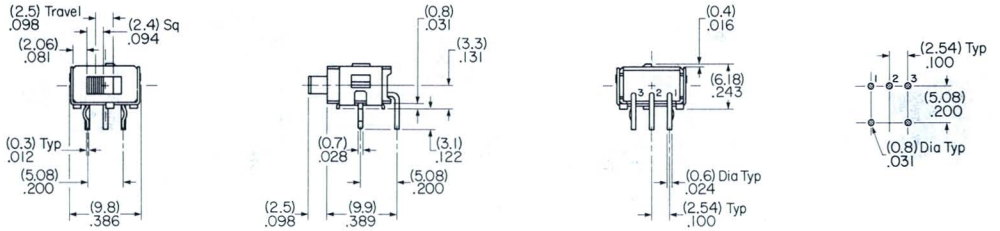
Slides

NKK SERIES A SLIDE SWITCHES

SUPER-SUBMINIATURE/PCB MOUNTING

H Right Angle PC Terminals with Bracket/Single Pole

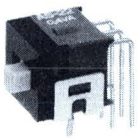


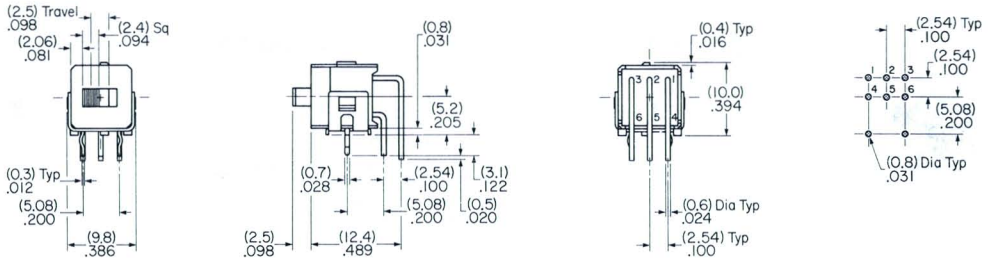


AS12AH Model Shown

(Actuator shown in UP position.)

H Right Angle PC Terminals with Bracket/Double Pole

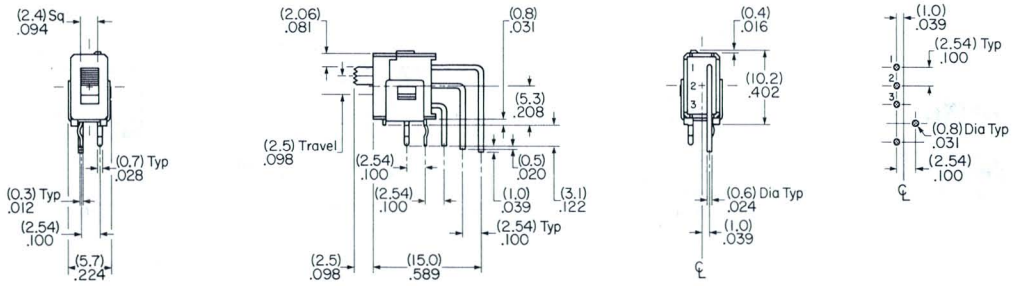




AS22AH Model Shown

(Actuator shown in UP position.)

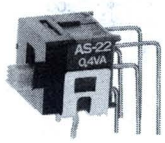
V Vertical PC Terminals with Bracket/Single Pole

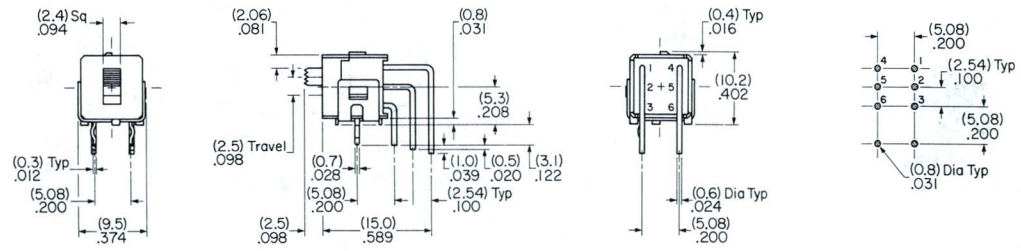


AS12AV Model Shown

(Actuator shown in UP position.)

V Vertical PC Terminals with Bracket/Double Pole





AS22AV Model Shown

(Actuator shown in UP position.)

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NKK SERIES A LED INDICATORS

SUPER-SUBMINIATURE/PCB MOUNTING

TYPICAL INDICATOR ORDERING EXAMPLE

A – 01 V F

MODELS	
01	Low Profile
02	High Profile

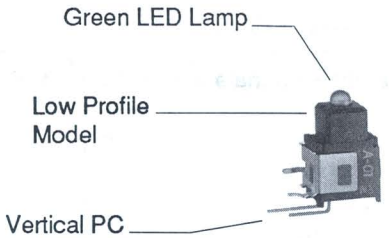
Optional snap-in panel mounts available; see Accessories section.

PC TERMINALS	
For 01 Model	
P	Straight
B	Straight w/Bracket
H	Right Angle
V	Vertical
For 02 Model	
P	Straight

LED COLORS	
C	Red
E	Yellow
F	Green

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (A01VF)

SERIES A LED INDICATOR



MODELS

A01 Low Profile

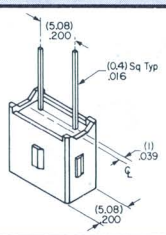
A02 High Profile

Available in Straight Terminals Only

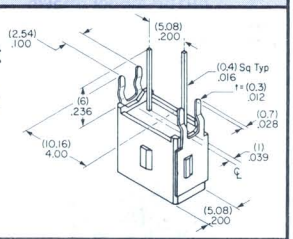
LED Colors: **C** Red **E** Yellow **F** Green

PC TERMINALS

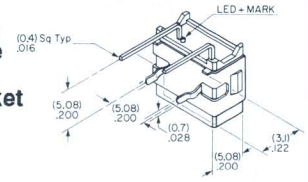
P Straight without Bracket



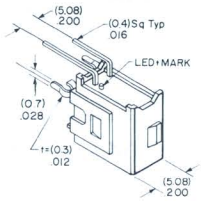
B Straight with Bracket



H Right Angle with Bracket



V Vertical with Bracket



ELECTRICAL SPECIFICATIONS FOR LEDS

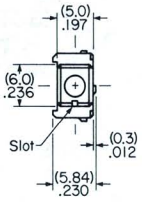
		A01 Indicator			A02 Indicator		
Lamp Color		Red	Yellow	Green	Red	Yellow	Green
Forward Peak Current	I_{FM}	50mA	50mA	50mA	25mA	30mA	30mA
Continuous Forward Current	I_F	30mA	30mA	30mA	20mA	20mA	20mA
Forward Voltage	V_F	1.7V	2.2V	2.1V	2.1V	2.1V	2.2V
Reverse Peak Voltage	V_{RM}	4V	4V	4V	4V	4V	4V
Current Reduction Rate Above 25°C	ΔI_F	0.67mA/°C	0.67mA/°C	0.67mA/°C	0.33mA/°C	0.40mA/°C	0.40mA/°C

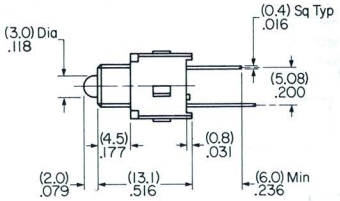
The electrical specifications shown above are determined at a basic temperature of 25°C. If the source voltage exceeds the LED's rated voltage, the required ballast resistor value can be calculated by using the formula and table of lamp resistor values located at the end of this catalog. Ambient operating temperature for these LEDs: -25°C ~ +85°C (-13°F ~ +185°F).

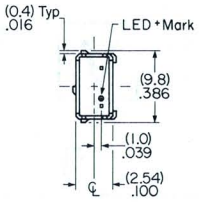
NKK SERIES A LED INDICATORS

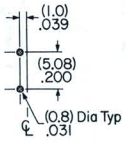
SUPER-SUBMINIATURE/PCB MOUNTING

P Straight Terminals without Bracket/Model 01



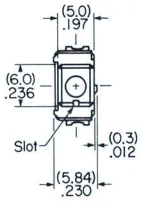


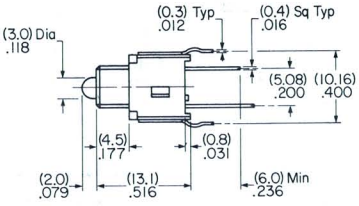


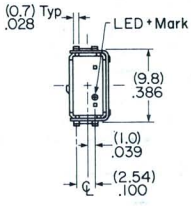


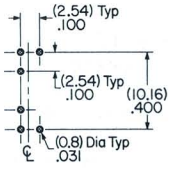
A01PF Model Shown

B Straight Terminals with Bracket/Model 01



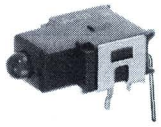


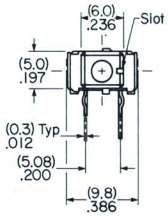


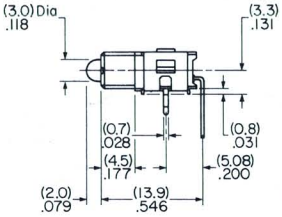


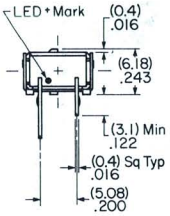
A01BF Model Shown

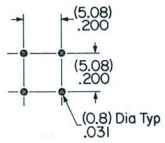
H Right Angle Terminals with Bracket/Model 01





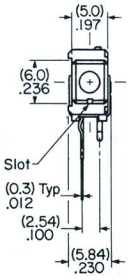


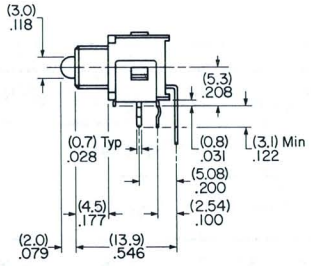


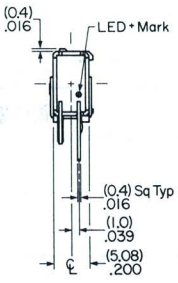


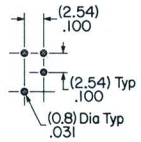
A01HF Model Shown

V Vertical Terminals with Bracket/Model 01



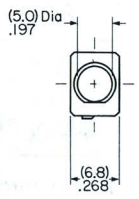


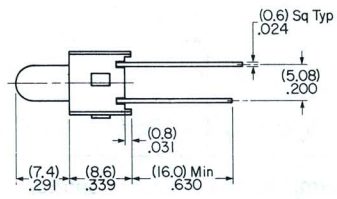


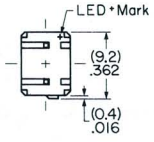


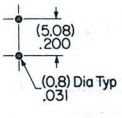
A01VF Model Shown

P Straight Terminals without Bracket/Model 02









A02PF Model Shown

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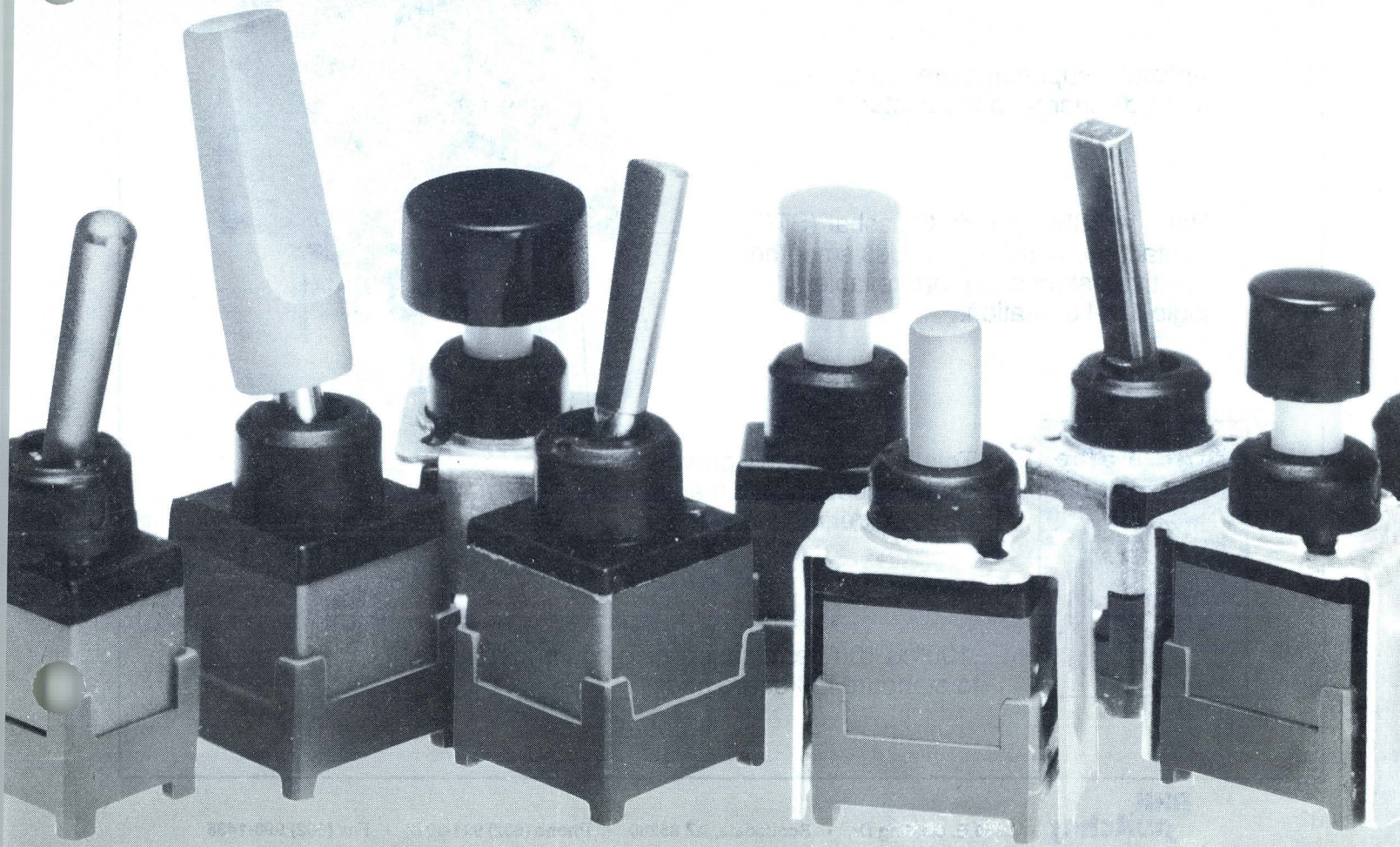
SERIES B

WASHABLE SUPER-SUBMINIATURE ANTISTATIC SWITCHES

● TOGGLES ● PUSHBUTTONS



NKK SERIES B

SUPER-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

DISTINCTIVE FEATURES

World's first to be approved by International Electrotechnical Commission's Quality Assessment System

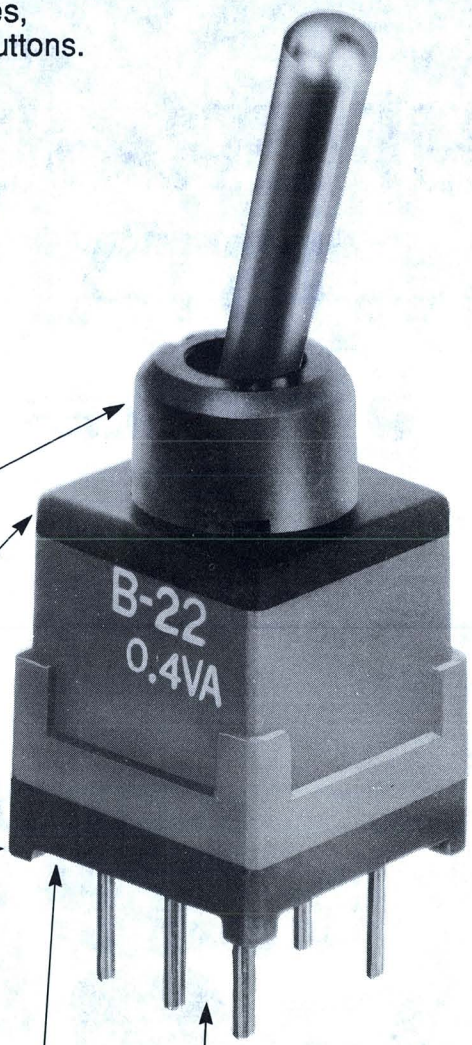
Available with toggles, paddles, and pushbuttons.

Industry's smallest alternate action pushbutton

Locking lever mechanism offered as a toggle option.

Smooth round 6mm diameter bushing simplifies panel layout.

Antistatic superstructure prevents static discharge to the contacts.



Patented Sliding Twin Crossbar (STC) contact mechanism provides smoother, positive detent and more reliable logic-level operation.

Actual Size

Totally sealed body prevents contact contamination and allows wave soldering and washing.

.100" x .100" terminal spacing conforms to standard PC board grids.

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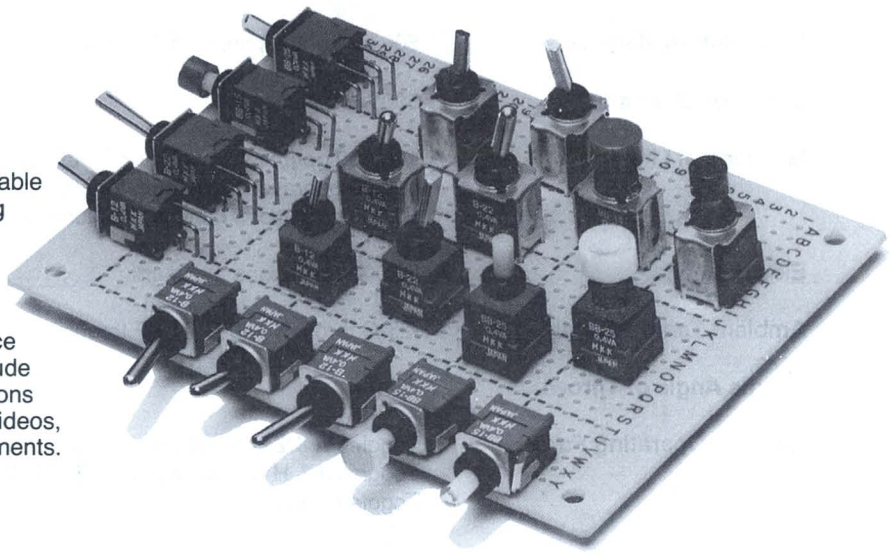
NKK SERIES B

SUPER-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

APPLICATIONS

- Toggles
- Pushbuttons

Ultraminiaturized B Series PC mountable switches feature an antistatic bushing which is smooth and round, Sliding Twin Crossbar (STC) contacts and sealed construction. They are recommended for use in products where reliability is essential and space is restricted. Typical applications include computers, peripherals, communications systems, medical equipment, home videos, cameras and small measuring instruments.



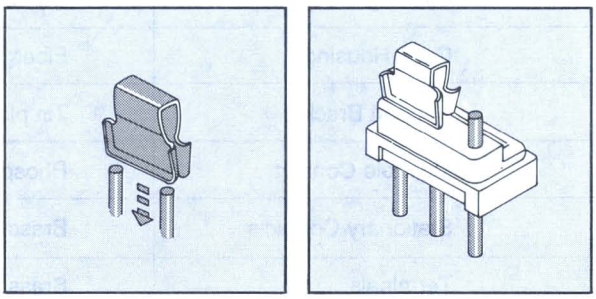
ANTISTATIC CONSTRUCTION

The switch is grounded to the PC board by means of the carbon impregnated bushing and the support bracket. Static electricity from an operator's touch travels a safe path from actuator through the bushing and bracket to the PC board, rather than traveling into the contacts.

SEALED FOR WASHABILITY

Sealed-body construction permits Series B switches to be subjected to time- and money-saving automated soldering techniques. As a result, they can be safely cleaned of flux without fear of compromising operating characteristics.

STC CONTACT MECHANISM



NKK's patented, award-winning STC contact mechanism offers benefits unavailable in conventional mechanisms. The movable twin contact surfaces pinch the stationary contacts to provide increased contact stability and unparalleled logic-level reliability. Continued reliability is assured since the gold-plated contacts are wiped clean with each actuation. Furthermore, if one side of the twin contacts should fail to conduct, the other side functions as a backup, or fail-safe path for the current. The combination of rounded movable and stationary contacts provides smooth contact feel previously unavailable in sliding contact type mechanisms.

NKK SERIES B TOGGLE SWITCHES

SUPER-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

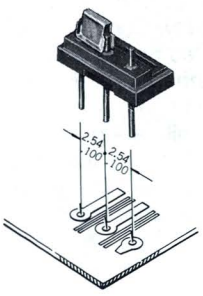
GENERAL SPECIFICATIONS

Electrical Capacity: **(Resistive Load)**	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	50 milliohms maximum
Insulation Resistance:	500 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	100,000 operations minimum for ON-NONE-ON & ON-OFF-ON 50,000 operations minimum for other circuits 50,000 operations minimum for locking lever models
Electrical Life:	50,000 operations minimum
Ambient Temp Range:	-25°C through +70°C (-13°F through +158°F)
Toggle Angle of Throw:	26°
Nominal Operating Force:	Toggles A & E & K w/Long Paddle: 150g (momentary); 120g (maintained) Toggles J & H & K w/Short Paddle: 278g (momentary); 188g (maintained) Toggle L: 60g

MATERIALS & FINISHES

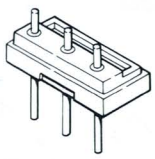
Toggle	Nickel plated brass
Bushing	Carbon blended polyamide; nickel plated zinc alloy for locking levers
Case Housing	Fiberglass reinforced polyamide
Support Bracket	Tin plated phosphor bronze
Movable Contact	Phosphor bronze with gold plating over silver plating
Stationary Contacts	Brass with gold plating over nickel undercoating
Terminals	Brass with gold plating over nickel undercoating

.100 INCH TERMINAL SPACING



Standard 2.54mm x 2.54mm (.100" x .100") grid spacing and 0.6mm (.024") diameter terminals simplify PC board mounting.

MOLDED-IN TERMINALS



Terminals are molded in the base and epoxy sealed to prevent flux, solvents, and other contaminants from reaching the contacts.

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NKK SERIES B TOGGLE SWITCHES

SUPER-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

B	2	3	K	B	-	A	F

POLES	
1	SPDT
2	DPDT SP3T

PC TERMINALS	
P	Straight
B	Straight w/Bracket
H	Right Angle w/Bracket
V	Vertical w/Bracket
W	Straight .744" Long

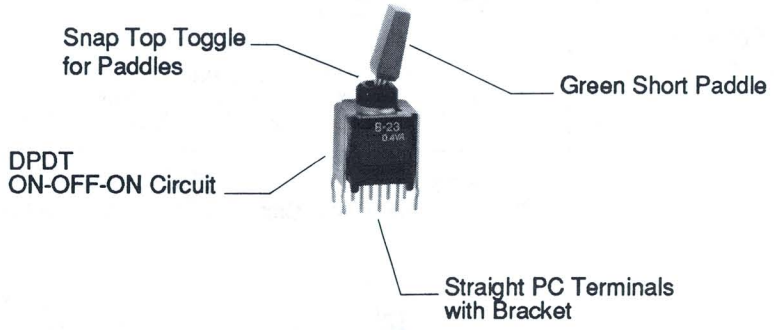
CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
4	ON	ON	ON
( ) = Momentary			

TOGGLES	
A	.394" Bat
E	.394" Flatted
H	.248" Flatted
J	.248" Bat
K	Snap Top for A or B Paddle
L	Locking Lever (w/Circuits 2 & 3 only)

PADDLES	
A	Short Paddle for K Toggle
B	Long Paddle for K Toggle
OPTIONAL CAPS	
G	.394" Bat Lever Cap
J	.248" Bat Lever Cap

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (B23KB-AF)

SERIES B TOGGLE

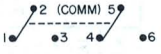
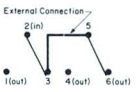
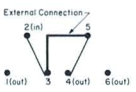
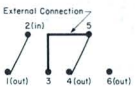


CAP COLORS		PADDLE COLORS
A	Black	A
B	White	B
C	Red	C
---	Yellow	E
---	Green	F
---	Blue	G
---	Gray	H

NKK SERIES B TOGGLE SWITCHES

SUPER-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

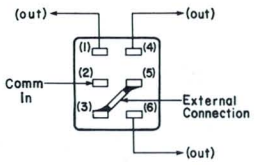
POLES AND CIRCUITS

POLE & THROW	MODEL	TOGGLE POSITION & TERMINAL NUMBERS (Momentary) Up (Slot)	Center	Down
SPDT	B12	ON	NONE	ON
	B13	ON	OFF	ON
	B15	ON	NONE	(ON)
	B18	(ON)	OFF	(ON)
	B19	ON	OFF	(ON)
CONNECTED TERMINALS		2-3	OPEN	2-1
SCHEMATIC				
DPDT	B22	ON	NONE	ON
	B23	ON	OFF	ON
	B25	ON	NONE	(ON)
	B28	(ON)	OFF	(ON)
	B29	ON	OFF	(ON)
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4
SCHEMATIC				
SP3T	B24	ON	ON	ON
CONNECTED TERMINALS W/O EXTRA CONNECTIONS		2-3 5-6	2-3 5-4	2-1 5-4
SCHEMATICS W/EXTERNAL CONNECTIONS				

Terminal numbers are not actually on the switch.

THREE-ON POSITIONS

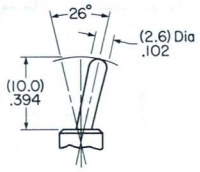
In the manufacture of the B24 model, a double pole double throw switch is converted to a single pole with 3 independent circuits. **The extra connection shown in the diagram must be made during field installation.** Note that terminal numbers are not actually indicated on the switch.



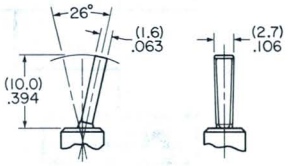
TOGGLES

Standard finish: Bright Nickel Optional finish: Black

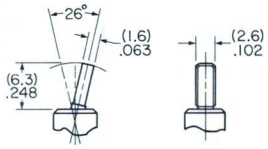
A .394" Bat



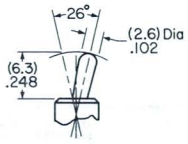
E .394" Flatted



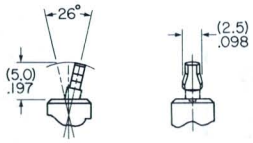
H .248" Flatted



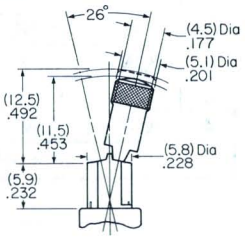
J .248" Bat



K Snap Top for Paddles

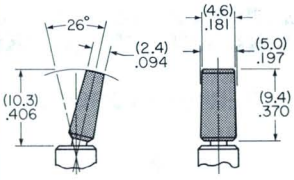


L Locking Lever

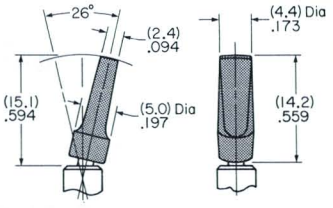


PADDLES & OPTIONAL CAPS

A AT467 Short Paddle

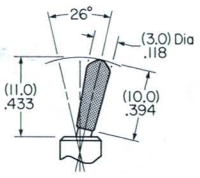


B AT468 Long Paddle

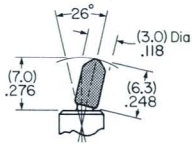


Paddle Material: Nylon
Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

G AT4003 .394" Bat Lever Cap



J AT4064 .248" Bat Lever Cap



Lever Cap Material: Polyvinyl chloride
Colors Available: **A** Black **B** White **C** Red

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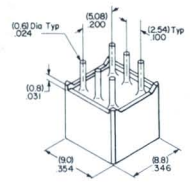
NKK SERIES B TOGGLE SWITCHES

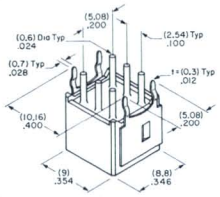
SUPER-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

PC TERMINALS

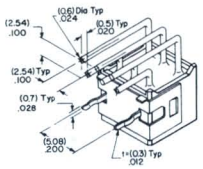
P Straight



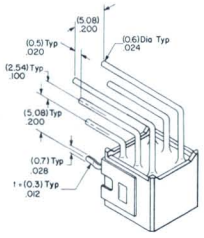
B Straight with Bracket



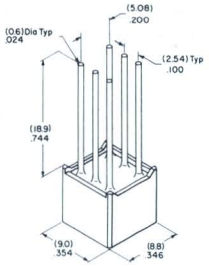
H Right Angle with Bracket



V Vertical with Bracket

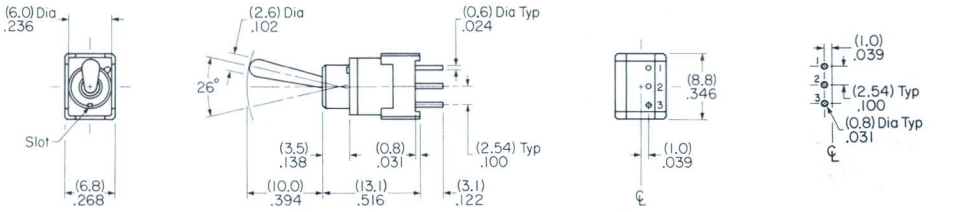


W Straight .744" Long



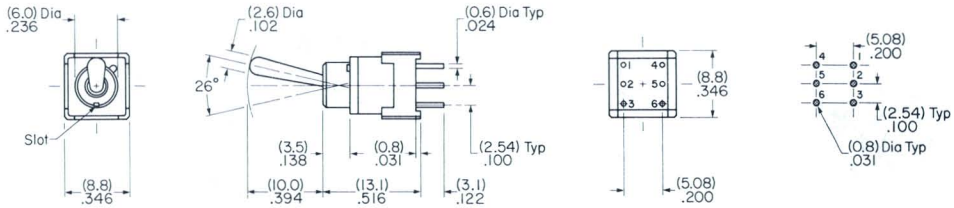
The use of a support bracket or placement of the round bushing in a panel cutout is recommended to increase PCB mounting stability.
Soldering time & temperature limits:
3 seconds @ 350°C
5 seconds @ 270°C
Freon or alcohol cleaning solvents are recommended.

P Straight Terminals without Bracket/Single Pole



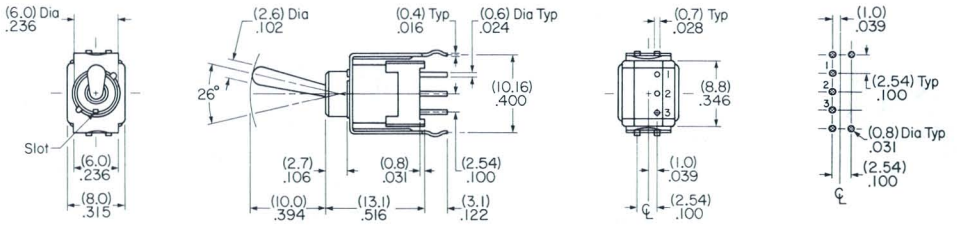
B12AP Model Shown

P Straight Terminals without Bracket/Double Pole



B22AP Model Shown

B Straight Terminals with Bracket/Single Pole



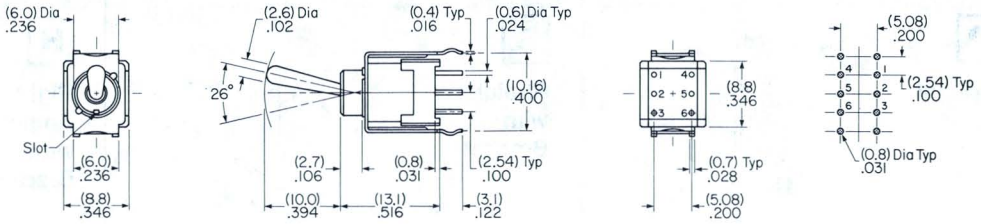
B12AB Model Shown

NKK SERIES B TOGGLE SWITCHES

SUPER-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

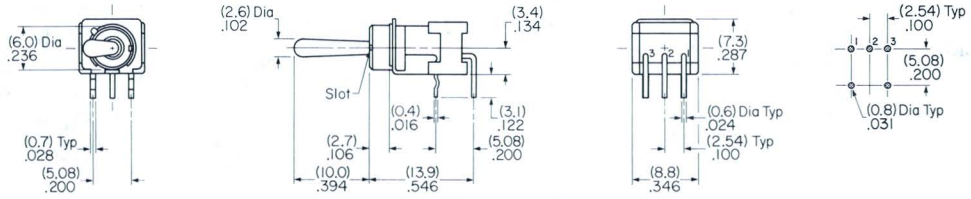
B Straight Terminals with Bracket/Double Pole

B22AB Model Shown

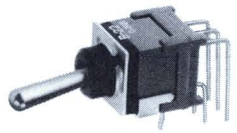


H Right Angle Terminals with Bracket/Single Pole

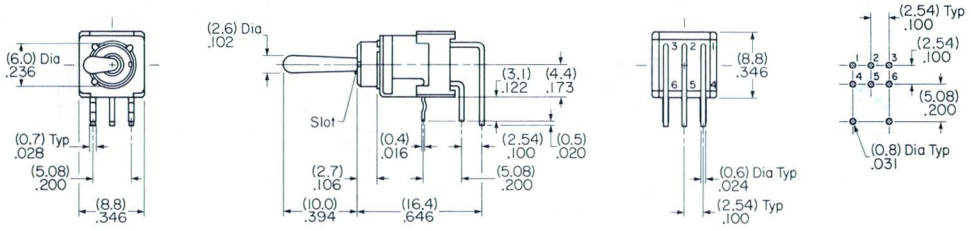
B12AH Model Shown



H Right Angle Terminals with Bracket/Double Pole

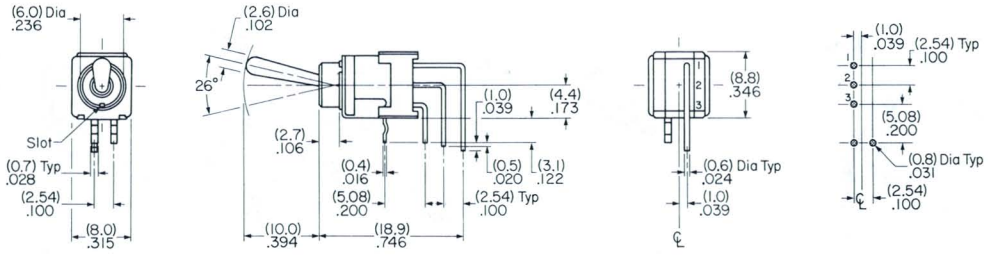


B22AH Model Shown

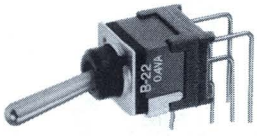


V Vertical Terminals with Bracket/Single Pole

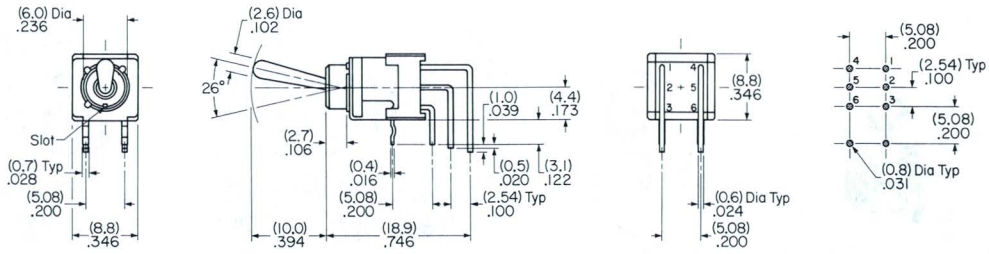
B12AV Model Shown



V Vertical Terminals with Bracket/Double Pole



B22AV Model Shown



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NKK SERIES B PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/ANTISTATIC/WASHABLE

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	50 milliohms maximum
Insulation Resistance:	500 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	50,000 operations min (momentary); 25,000 operations min (alternate action)
Electrical Life:	50,000 operations min (momentary); 25,000 operations min (alternate action)
Ambient Temp Range:	-25°C through +70°C (-13°F through +158°F)
Travel:	Momentary: Pretravel 0.7mm (.028"); Overtravel 0.4mm (.016"); Total 1.1mm (.043") Alternate: Pretravel 1.0mm (.039"); Overtravel 1.0mm (.039"); Total 2.0mm (.079")
Nominal Operating Force:	260 grams (momentary); 300 grams (alternate action)

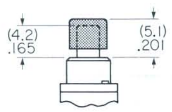
MATERIALS & FINISHES

Plunger	Polyacetal
Bushing	Carbon blended polyamide
Case Housing	Fiberglass reinforced polyamide
Support Bracket	Tin plated phosphor bronze
Movable Contact	Phosphor bronze with gold plating over silver plating
Stationary Contacts	Brass with gold plating over nickel undercoating
Terminals	Brass with gold plating over nickel undercoating

SEALED FOR WASHABILITY

Sealed-body construction permits Series B pushbutton switches to be subjected to time- and money-saving automated soldering techniques. They can be safely cleaned of flux without fear of compromising operating characteristics; **the actuator must be in UP position during washing and cap removal.** Freon or alcohol cleaning solvents are recommended.

LATCHDOWN DIMENSIONS



The latchdown feature on maintained circuits provides visible, audible, and tactile feedback.

NKK SERIES B PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/ANTISTATIC/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

BB 2 5 A V - F C

POLES

1	SPDT
2	DPDT

CIRCUITS

5	ON	(ON)
6	ON	ON
( ) = Momentary		

PLUNGER

A	.213" Long

PC TERMINALS

P	Straight
B	Straight w/Bracket
H	Right Angle w/Bracket
V	Vertical w/Bracket
W	Straight .744" Long (shown in toggle section)

CAPS

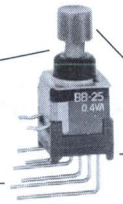
F	.201" Diameter
H	.295" Diameter

CAP COLORS

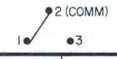
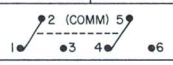
A	Black
B	White
C	Red

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (BB25AV-FC)

SERIES BB PUSHBUTTON



POLES AND CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS (Momentary) Normal	Down
SPDT	BB15	ON	(ON)
	BB16	ON	ON
CONNECTED TERMINALS		2-3	2-1
SCHEMATIC			
DPDT	BB25	ON	(ON)
	BB26	ON	ON
CONNECTED TERMINALS		2-3 5-6	2-1 5-4
SCHEMATIC			

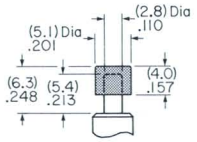
Terminal numbers are not actually on the switch.

TERMINALS

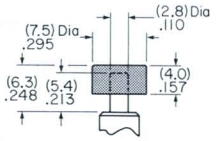
Terminal dimensions are in the following drawings. Note that the single pole alternate action model is in a double pole base.

OPTIONAL SLIP-ON CAPS

F AT475 .201" Dia. Cap



H AT496 .295" Dia. Cap



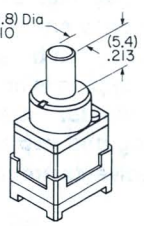
Material: Polycarbonate

Colors Available: **A** Black **B** White **C** Red

Freon or alcohol cleaning solvents are recommended for protection of polycarbonate parts.

PLUNGER

A .213" Long



Standard color: White

For other color options & plunger lengths, contact factory.

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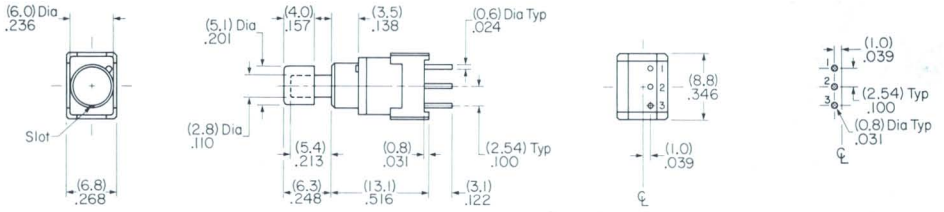
NKK SERIES B PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/ANTISTATIC/WASHABLE

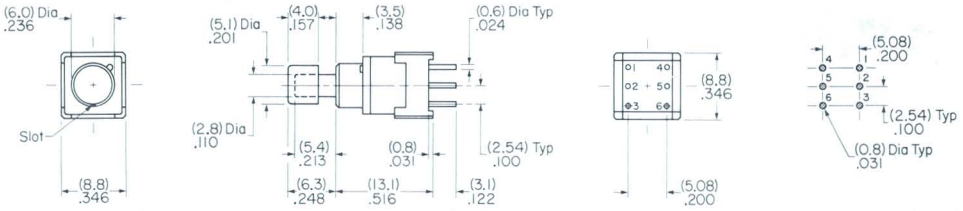
Single pole alternate action detail drawings and footprints are located at the end of the next page.

P — Straight Terminals without Bracket/Single Pole — For Single Pole Momentary



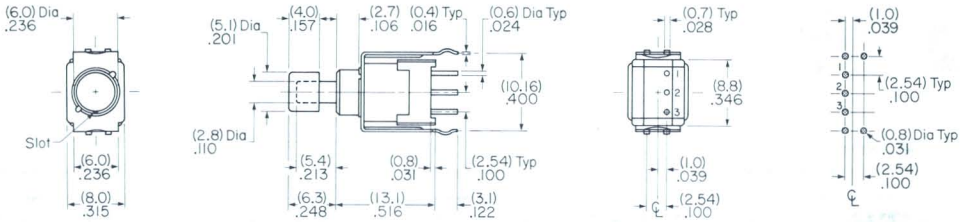
BB15AP-FA Model Shown

P — Straight Terminals without Bracket/Double Pole — For DP Momentary or SP & DP Alternate Action



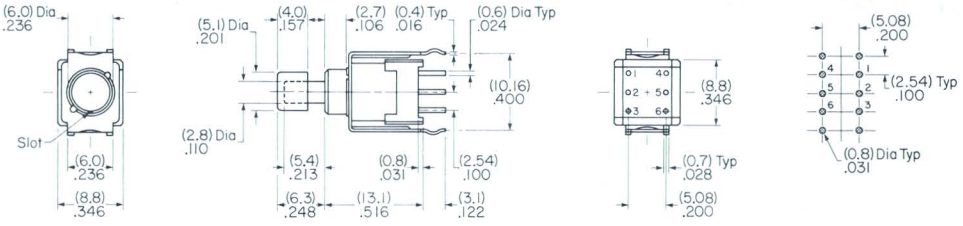
BB25AP-FA Model Shown

B — Straight Terminals with Bracket/Single Pole — For SP Momentary



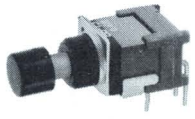
BB15AB-FA Model Shown

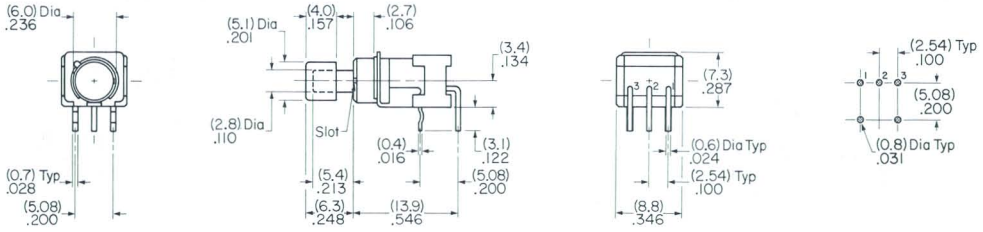
B — Straight Terminals with Bracket/Double Pole — For DP Momentary or SP & DP Alternate Action



BB25AB-FA Model Shown

H — Right Angle Terminals with Bracket/Single Pole — For Single Pole Momentary





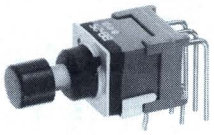
BB15AH-FA Model Shown

NKK SERIES B PUSHBUTTON SWITCHES

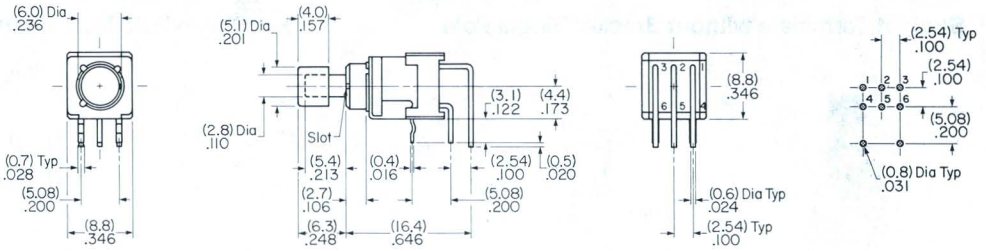
MOMENTARY & ALTERNATE/ANTISTATIC/WASHABLE

H Right Angle Terminals with Bracket/Double Pole

For DP Momentary or SP & DP Alternate Action



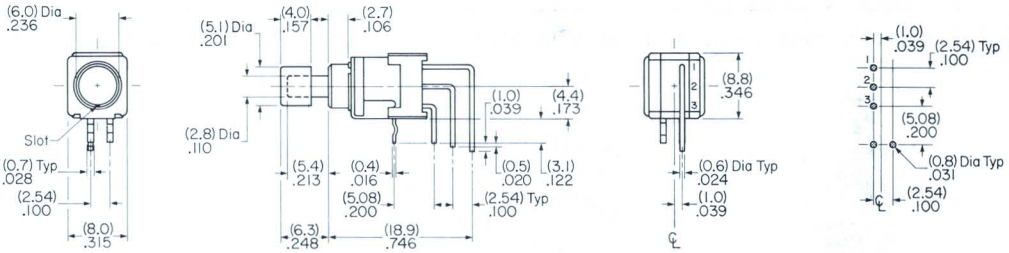
BB25AH-FA Model Shown



V Vertical Terminals with Bracket/Single Pole

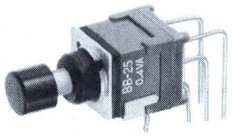
For SP Momentary

BB15AV-FA Model Shown

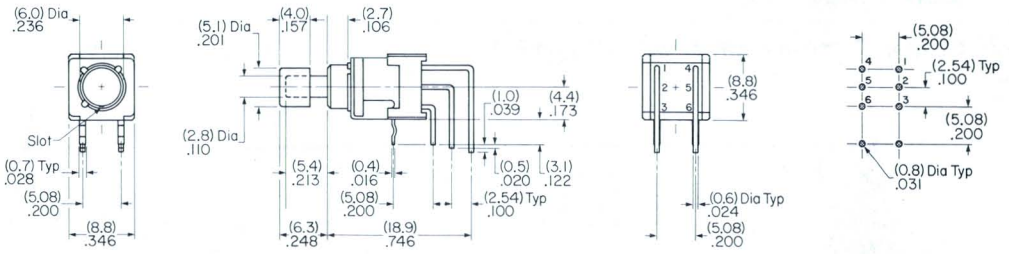


V Vertical Terminals with Bracket/Double Pole

For DP Momentary or SP & DP Alternate Action



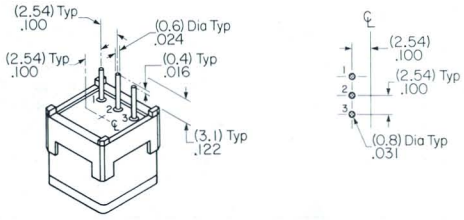
BB25AV-FA Model Shown



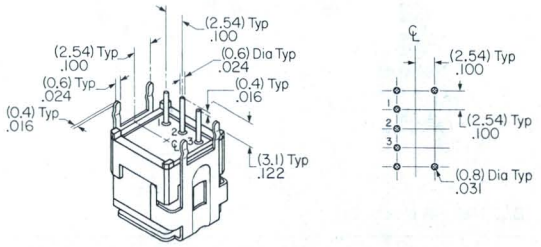
TERMINAL DETAIL & FOOTPRINTS FOR SINGLE POLE ALTERNATE ACTION MODELS

All alternate action models have double pole bases.

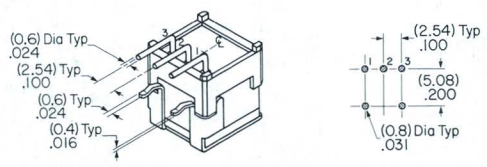
P Straight Terminals



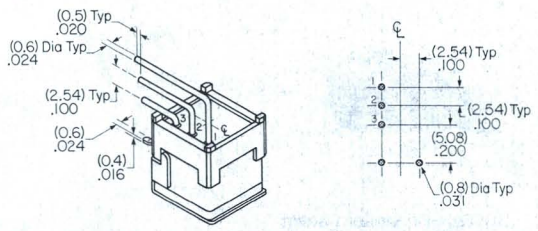
B Straight Terminals with Bracket



H Right Angle Terminals with Bracket



V Vertical with Bracket



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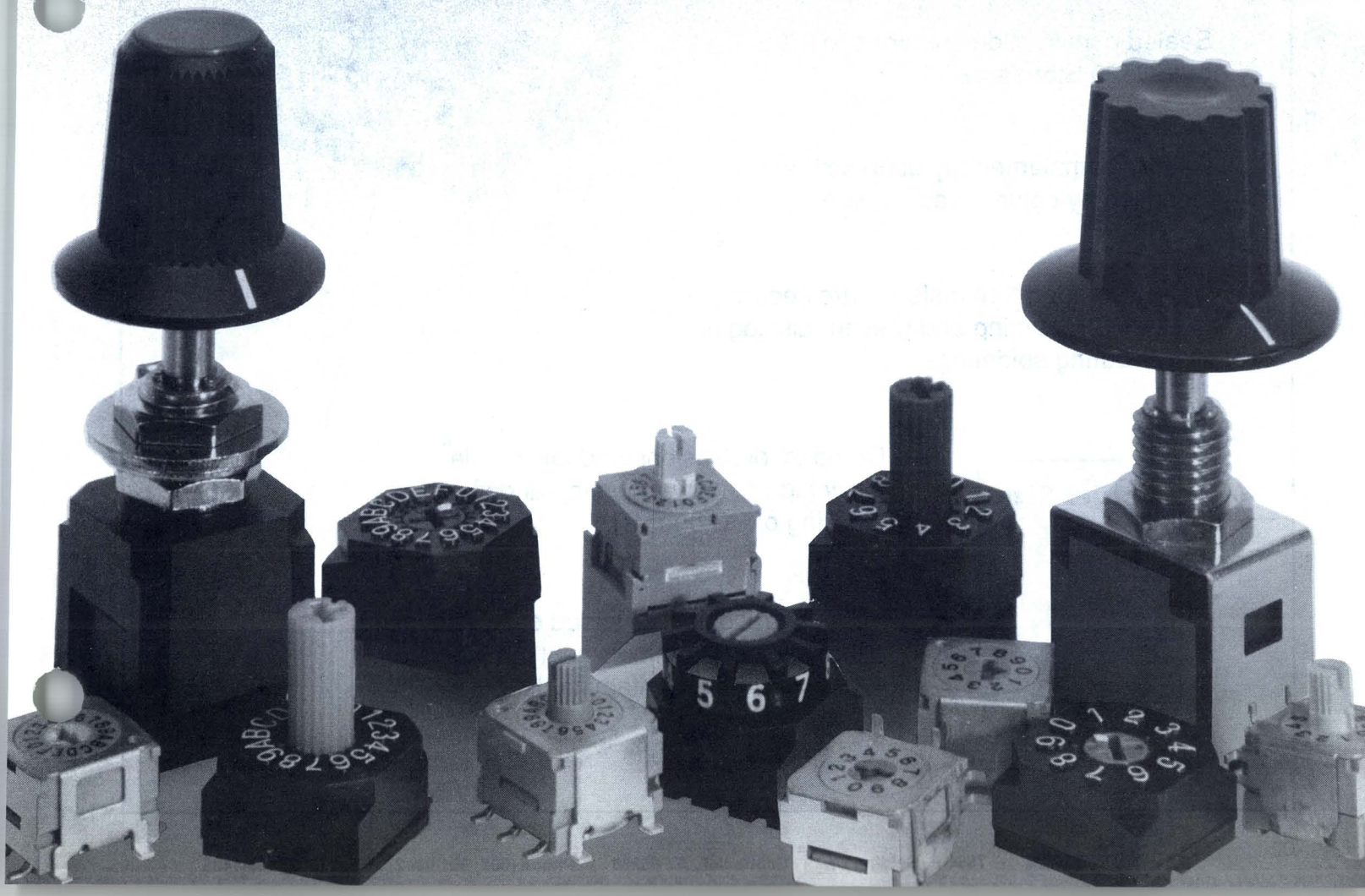
SERIES DR & ND

DIP ROTARY SWITCHES



NKK SERIES DR

BINARY CODED/DIP ROTARY

DISTINCTIVE FEATURES

Highly visible legends and choice of screw-driver, shaft or dial adjusted actuators provide trouble-free code setting. Knob actuator also available.

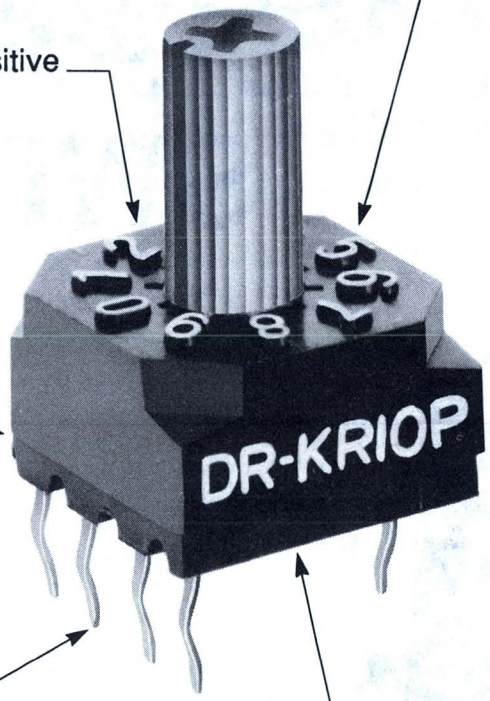
Detent mechanism gives crisp, positive action for accurate switch setting.

O-ring sealed actuator and self-wiping contacts assure contact reliability and continuity.

Sealed construction conforms to IP65 of IEC529 Standards.

Real or complementary code setting identified by color-keyed actuator.

Crimped terminals ensure secure PC mounting and prevent dislodging during soldering.



Actual Size

Compact dimensions and low profile allow high density mounting and close stacking of PC boards.

Ultrasonically welded case and insert molded terminals seal out flux, dust, and other contaminants.

Rotaries

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NKK SERIES DR ROTARY SWITCHES

BINARY CODED/DIP ROTARY

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	Switching Rating: 100mA @ 5V DC Nonswitching Rating: 100mA @ 50V DC
Contact Resistance:	80 milliohms maximum (circuit) 30 milliohms maximum (contact point)
Insulation Resistance:	1,000 megohms minimum @ 250V DC
Dielectric Strength:	250V AC minimum
Mechanical Life:	20,000 detent operations minimum
Electrical Life:	20,000 detent operations minimum

Note: A detent operation is one actuator position operation or stepping. 20,000 detent operations = 1,250 cycles for hexadecimal devices or 2,000 cycles for decimal devices. A cycle is one 360° rotation.

Operating Torque:	120 ~ 260 grams-cm (1.7 ~ 3.6 ounce-in)
Ambient Temp Range:	-25°C through +75°C (-13°F through +167°F)

MATERIALS & FINISHES

Shaft & Bushing (DRA only)	Brass with nickel plating
Actuator	Polyacetal
Housing & Case	Fiberglass reinforced PBT
O-rings	Nitrile butadiene rubber
Base	Fiberglass reinforced PBT
Movable Contact	Copper with gold plating
Stationary Contacts	Phosphor bronze with gold plating over nickel plating
Terminals	Phosphor bronze with gold strike over nickel plating

APPLICATIONS

DR Series answers the ever expanding need for highly reliable, variable circuit devices for programming electronic equipment. These switches are suitable for digital setting of computer peripherals, as data entry devices for address encoding and presetting of microcomputers, as simple PROMs, or for selection of input-output boards.

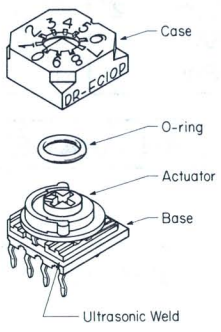
These rotaries are offered with either screwdriver, shaft, dial, or knob actuators. Real or complement code setting is available with either decimal or hexadecimal positions, and straight or right angle PC terminals with gold contacts. Terminals are spaced to conform to standard .100" grid spacing. Straight PC terminals are spaced .100" X .300" making them DIP socket compatible as well.

SEALED BODY CONSTRUCTION

Sealed construction of these switches is accomplished with an ultrasonically welded case and base, as well as an o-ring seal between the case and actuator. Insert molded terminals also prevent entry of contaminants.

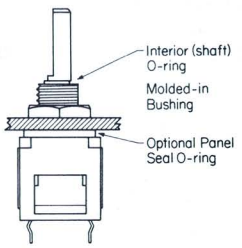
DR models are suitable for automated wave soldering and subsequent washing. It is recommended that washing be done at room temperature with detergent-water or Freon.

Manual soldering may be done for 3 seconds @ 350°C or for 5 seconds @ 270°C.



OPTIONAL PANEL SEAL MOUNTING

The knob actuated DRA models have a threaded bushing for panel mounting. The o-ring AT085 can be selected and installed behind the panel to achieve a panel seal which prevents splashed or sprayed liquids from getting behind the panel. This series can be provided with bracket for added stability in PCB mounting.



Rotaries

NKK SERIES DR ROTARY SWITCHES

BINARY CODED/DIP ROTARY

TYPICAL SWITCH ORDERING EXAMPLE

DR F R 10 P [ ]

ACTUATORS	
PCB Mount	
F	Screwdriver Actuated
K	Shaft Actuated
S	Dial Actuated (For straight terminals only)
Panel or PCB Mount	
A	Knob Actuated

CIRCUITS	
R	Real Coded
C	Complement Coded
G	Gray Coded

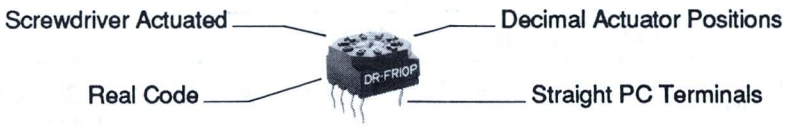
POSITIONS	
10	Decimal
16	Hexadecimal

PC TERMINALS	
P	Straight
H	Right Angle

BRACKETS	
NO CODE	No Bracket
B	W/Bracket for DRA model only

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (DRFR10P):

SERIES DR ROTARY



ACTUATORS

F Screwdriver Actuated

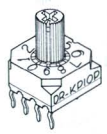
Adjusted with a flat or phillips tipped screwdriver or Snap-in Knob AT4061.

S Dial Actuated

Adjusted by hand or with a flat tipped screwdriver.

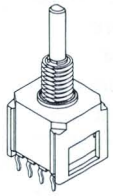
K Shaft Actuated

Adjusted by hand or with a flat or phillips tipped screwdriver.



A Knob Actuated

Adjusted with Knob AT433, AT4103, or AT4104 (to be ordered separately)



Actuators are fully rotational and operate either clockwise or counterclockwise. Real coded devices have orange actuators. Complement coded have red actuators.

TRUTH TABLES

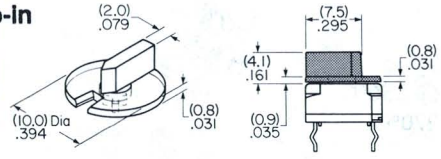
Actuator Positions: 16 Hexadecimal Positions; 10 Decimal Positions

⊗ = ON

	Terminal Number (Output)	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
R	Real Coded	1		⊗		⊗		⊗		⊗		⊗		⊗		⊗		⊗
	Model Numbers:	2			⊗	⊗			⊗	⊗			⊗	⊗			⊗	⊗
	DRFR, DRKR,	4					⊗	⊗	⊗	⊗					⊗	⊗	⊗	⊗
	DRSR, & DRAR	8								⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
C	Complement Coded	1	⊗		⊗		⊗		⊗		⊗		⊗		⊗		⊗	
	Model Numbers:	2	⊗	⊗			⊗	⊗			⊗	⊗			⊗	⊗		
	DRFC, DRKC,	4	⊗	⊗	⊗	⊗					⊗	⊗	⊗	⊗				
	DRSC, & DRAC	8	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗								
G	Gray Coded	1		⊗	⊗			⊗	⊗			⊗	⊗			⊗	⊗	
	Model Numbers:	2			⊗	⊗	⊗	⊗					⊗	⊗	⊗	⊗		
	DRFG, DRKG,	4					⊗	⊗	⊗	⊗	⊗	⊗	⊗					
	DRSG, & DRAG	8								⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗

OPTIONAL SNAP-IN KNOB

AT4061 Snap-in Knob for "F" Actuator
Polycarbonate
Black with clear flange



Install knob before mounting on PCB; it should not be removed once mounted. When mounting, align slit in knob with white pointer on actuator.

Rotaries

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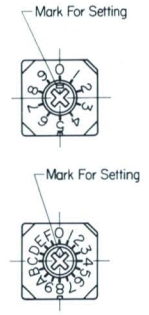
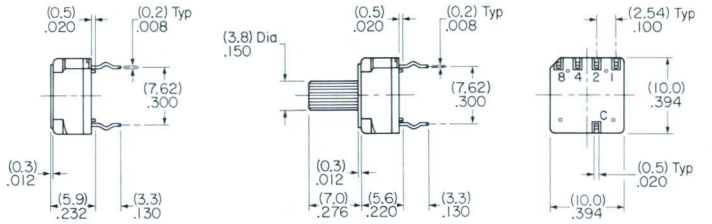
NKK SERIES DR ROTARY SWITCHES

BINARY CODED/DIP ROTARY

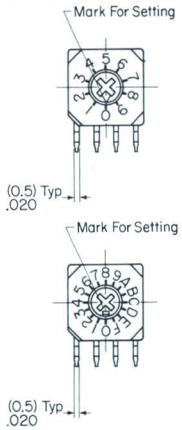
P Screwdriver & Shaft Actuated/Straight PC Terminals

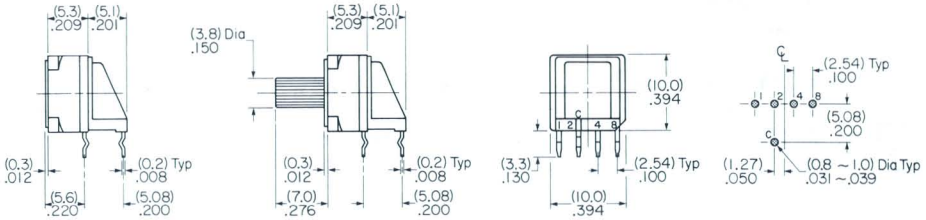




DRFR10P Model Shown

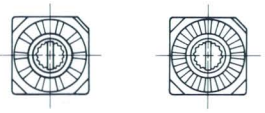
H Screwdriver & Shaft Actuated/Right Angle PC Terminals

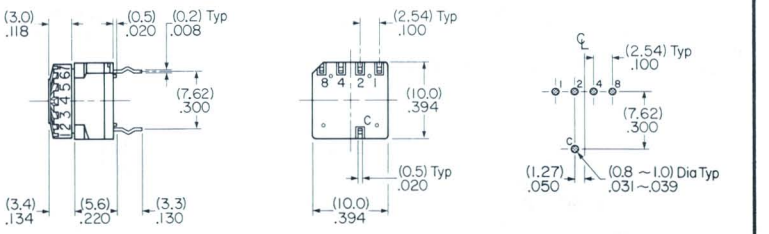




DRKR10H Model Shown

P Dial Actuated/Straight PC Terminals



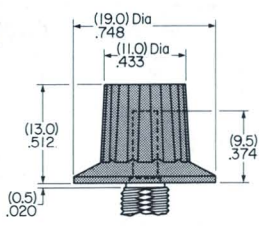


DRSR10P Model Shown

KNOBS FOR KNOB ACTUATED MODELS

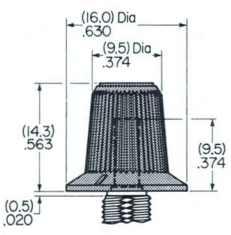
AT433
Plain Black

Polyacetal
Black only



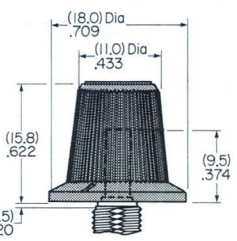
AT4103
Short
Color Tipped

Polyester with
polyamide tip
Black base
Tip Colors:
A, B, C, E,
F, G, H



AT4104
Long
Color Tipped

Polyester with
polyamide tip
Black Base
Tip Colors:
A, B, C, E,
F, G, H



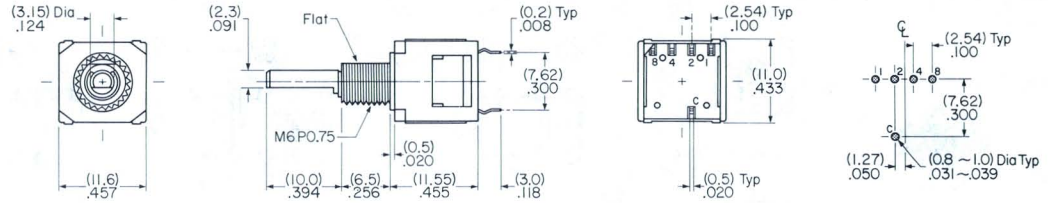
All actuator knobs must be ordered separately. Color Codes: A black B white C red E yellow F green G blue H gray
To install, position white line on the knob opposite (180°) the shaft flat when shaft is set for position 0 as shown in the dimension drawings.

Rotaries

NKK SERIES DR ROTARY SWITCHES

BINARY CODED/DIP ROTARY

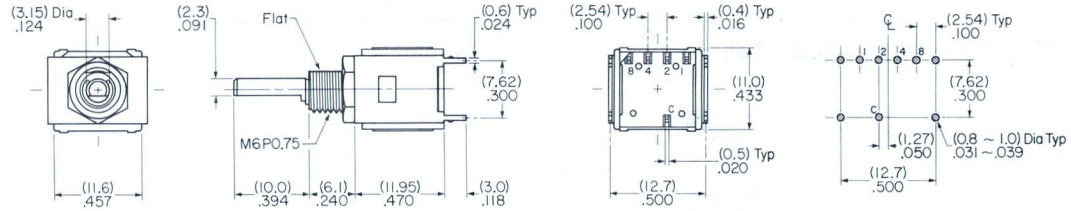
P Knob Actuator/Straight PC Terminals without Bracket



DRAR10P Model Shown

Shown in Position 0 with shaft flat rotated 180° from bushing flat.

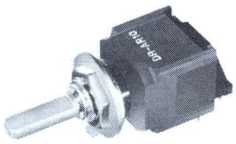
PB Knob Actuator/Straight PC Terminals with Bracket (Order Hardware Separately)

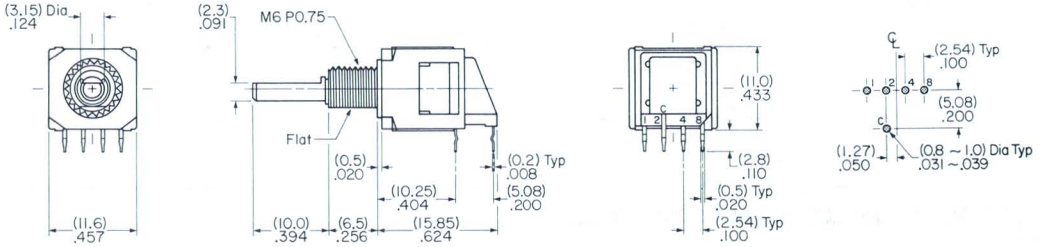


DRAR10PB Model Shown

Shown in Position 0 with shaft flat rotated 180° from bushing flat.

H Knob Actuator/Right Angle PC Terminals without Bracket

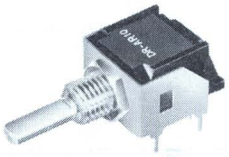


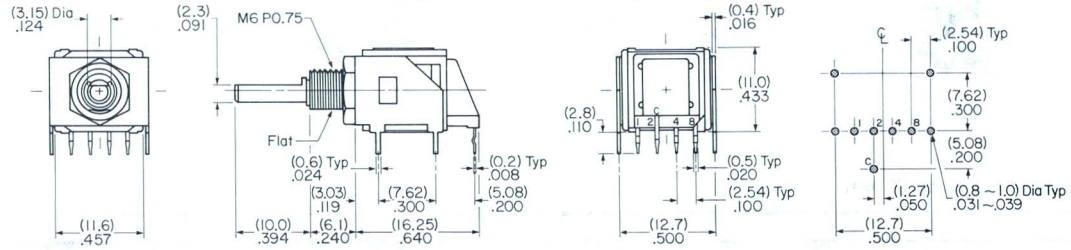


DRAR10H Model Shown

Shown in Position 0 with shaft flat rotated 180° from bushing flat.

HB Knob Actuator/Right Angle PC Terminals with Bracket (Order Hardware Separately)



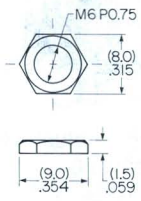


DRAR10HB Model Shown

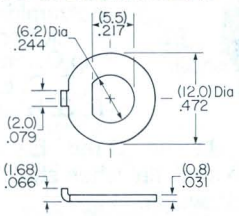
Shown in Position 0 with shaft flat rotated 180° from bushing flat.

HARDWARE SUPPLIED WITH UNBRACKETED MODELS

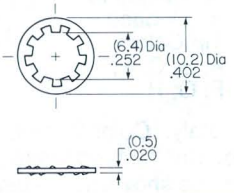
AT513M Hex Nut
Nickel/Brass



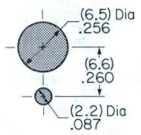
AT515 Locking Ring
Steel w/Chromate/Zinc



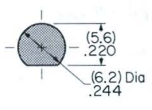
AT509 Lockwasher
Steel w/Chromate/Zinc



PANEL MOUNTING



Max Effective Panel Thickness: 1.5mm (.059")



Max Effective Panel Thickness: 2.3mm (.091")

Rotaries

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NKK SERIES ND

MICRO-SUBMINIATURE/BINARY CODED/DIP ROTARY

DISTINCTIVE FEATURES

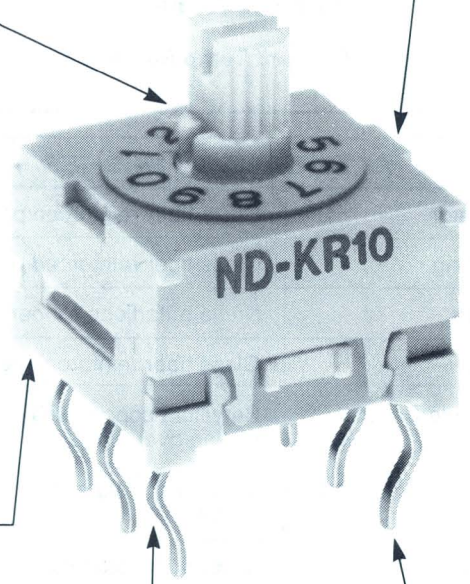
Compact size and interlocking sides for high density, side-by-side mounting.

Sealed construction, prevents contact contamination and allows time- and money-saving automated soldering and washing.

Highly visible legends and choice of screwdriver or shaft actuation to provide trouble-free code setting.

Detent mechanism designed for crisp, positive action for accurate switch setting.

Bifurcated, spring loaded contacts give unmatched logic-level reliabiity.



Heat tolerant resin used for body meets UL fire resistance rating 94VO and maintains switch reliability through automated soldering process.

Actual Size

Crimped terminals ensure secure PC mounting and prevent dislodging during soldering.

.100" terminal grid spacing between pin centers, plus 3-by-3 terminal arrangement for footprint pattern equivalent to industry standard.

SERIES ND ROTARY SWITCHES

MICRO-SUBMINIATURE/BINARY CODED/DIP ROTARY

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	Nonswitching Rating: 100mA @ 50V DC Switching Rating: 100mA @ 5V DC
Contact Resistance:	80 milliohms maximum (circuit) 30 milliohms maximum (contact point)
Insulation Resistance:	1,000 megohms minimum @ 250V DC
Dielectric Strength:	250V AC minimum
Mechanical Life:	20,000 detent operations minimum
Electrical Life:	20,000 detent operations minimum

Note: A detent operation is one actuator position operation or stepping. 20,000 detent operations = 1,250 cycles for hexadecimal devices or 2,000 cycles for decimal devices. A cycle is one 360° rotation.

Operating Torque:	50 grams-cm (0.70 ounce-in)
Ambient Temp Range:	-25°C through +75°C (-13°F through +167°F)

MATERIALS & FINISHES

Actuator	Glass fiber reinforced polyamide
Housing	Glass fiber reinforced polyamide
O-ring	Nitrile butadiene rubber
Base	Glass fiber reinforced polyamide
Movable Contact	Beryllium copper with gold plating over nickel
Stationary Contacts	Brass with gold plating over nickel
Terminals	Brass with gold plating over nickel

APPLICATIONS

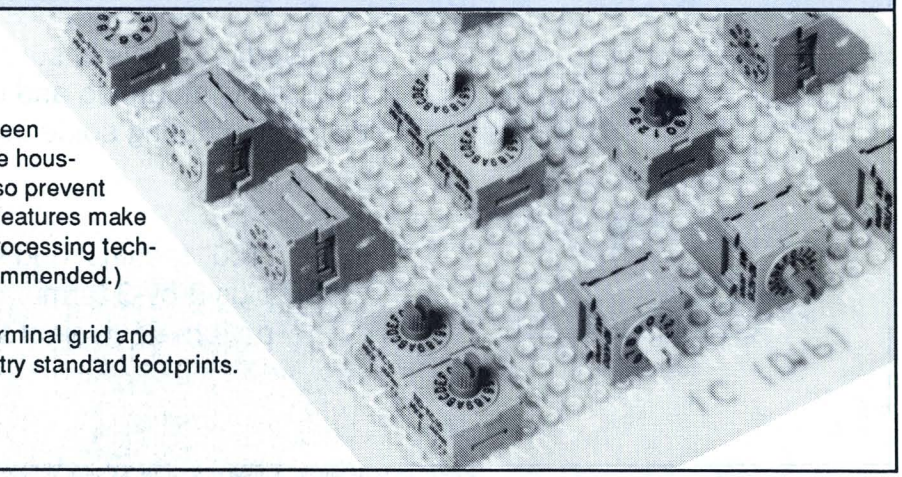
ND Series answers the ever expanding need for high reliability and versatility in many applications where digital setting is required: programming electronic equipment, in computer peripherals, as data entry devices for address encoding and presetting of microcomputers, as simple PROMs, or for selection of input-output boards.

These rotaries are offered with either screwdriver or shaft type actuators. Real or complement code setting is available with either decimal or hexadecimal positions, and straight or right angle PC terminals with gold contacts. Terminals are spaced to conform to standard .100" grid spacing. Both straight and right angle terminals are spaced .100" X .200" making them DIP socket compatible as well.

WASHABILITY & UNIVERSAL FOOTPRINT

Sealed construction of these DIP rotary switches is accomplished with seals between the actuator and housing and between the housing and base. Insert molded terminals also prevent entry of contaminants. These combined features make the ND models washable in automated processing techniques. (Alcohol based solvents are recommended.)

A standard footprint pattern with .100" terminal grid and 3-by-3 terminal arrangement match industry standard footprints.



Rotaries

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NKK SERIES ND ROTARY SWITCHES

MICRO-SUBMINIATURE/BINARY CODED/DIP ROTARY

TYPICAL SWITCH ORDERING EXAMPLE

ND K C 10 P

ACTUATORS	
F	Screwdriver Actuated
K	Shaft Actuated

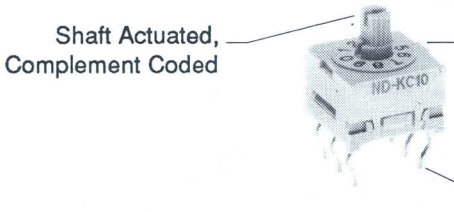
CIRCUITS	
R	Real Coded (white actuator)
C	Complement Coded (red actuator)

POSITIONS	
10	Decimal
16	Hexadecimal

PC TERMINALS	
P	Straight
H	Right Angle

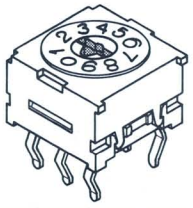
DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (NDKC10P):

SERIES ND ROTARY

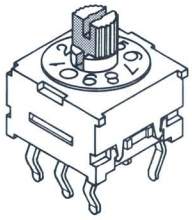


ACTUATORS

F Screwdriver Actuated



K Shaft Actuated



Actuators are fully rotational in either direction. Actuator colors: white for real coded & red for complement coded.

PC TERMINALS

P Straight

H Right Angle

SOLDERING

Time & Temperature Limitations:

10 seconds @ 260°C

or

5 seconds @ 270°C

CIRCUITS & POSITIONS

Additional information in table at right.

R Real Coded Circuit

C Complement Coded Circuit

10 Decimal - 10 Positions

16 Hexadecimal - 16 Positions

TRUTH TABLES

Actuator Positions — ⊗ = ON

16 Hexadecimal Positions

10 Decimal Positions

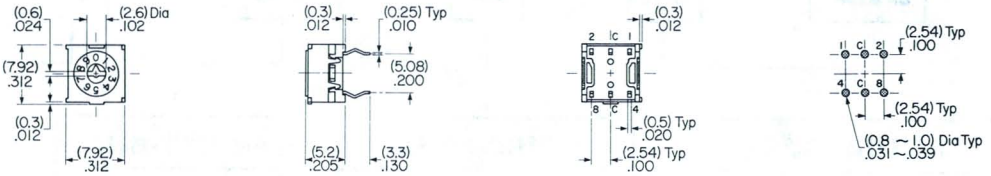
Terminal Number (Output)		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
R Real Coded — Model Numbers: NDFR & NDKR	1		⊗		⊗		⊗		⊗		⊗		⊗		⊗		⊗
	2			⊗	⊗			⊗	⊗			⊗	⊗			⊗	⊗
	4					⊗	⊗	⊗	⊗					⊗	⊗	⊗	⊗
	8									⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
C Complement Coded — Model Numbers: NDFC & NDKC	1	⊗		⊗		⊗		⊗		⊗		⊗		⊗		⊗	
	2	⊗	⊗			⊗	⊗			⊗	⊗			⊗	⊗		
	4	⊗	⊗	⊗	⊗					⊗	⊗	⊗	⊗				
	8	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗								

Rotaries

NKK SERIES ND ROTARY SWITCHES

MICRO-SUBMINIATURE/BINARY CODED/DIP ROTARY

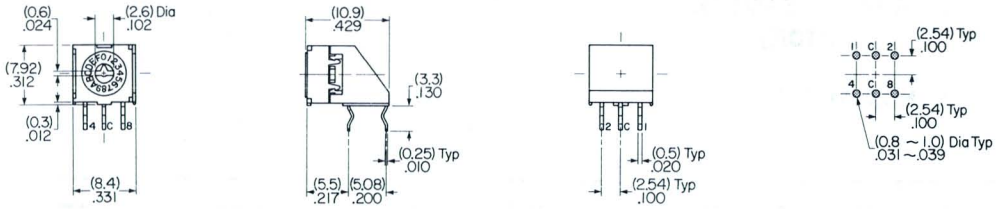
P Screwdriver Actuated/Straight PC Terminals



NDFR10P Model Shown

Terminal numbers not on switch.

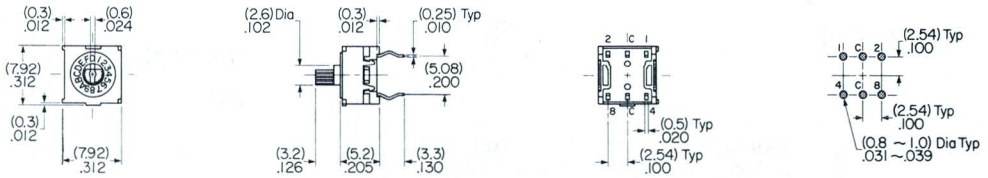
H Screwdriver Actuated/Right Angle PC Terminals



NDFC16H Model Shown

Terminal numbers on terminal cover.

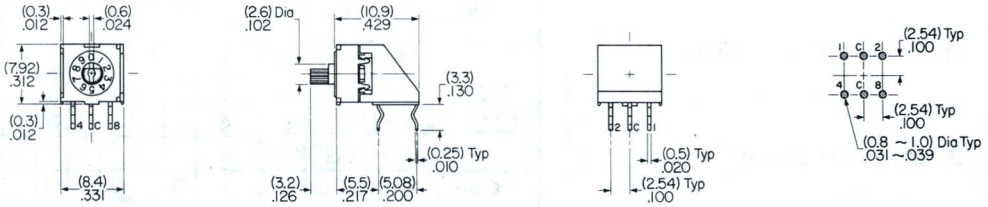
P Shaft Actuated/Straight PC Terminals



NDKC16P Model Shown

Terminal numbers not on switch.

H Shaft Actuated/Right Angle PC Terminals



NDKR10H Model Shown

Terminal numbers on terminal cover.

Rotaries

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NKK SERIES ND3

SURFACE MOUNT/BINARY CODED/DIP ROTARY

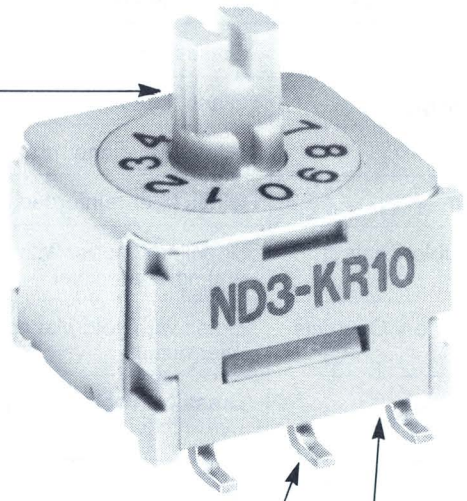
DISTINCTIVE FEATURES

Compact size plus terminal design for high density, side-by-side surface mounting.

Vapor phase solderable because of highly heat resistant resins used in construction.

Sealed construction prevents contact contamination and allows time- and money-saving automated soldering and washing.

Highly visible legends and choice of screwdriver or shaft actuation to provide trouble-free code setting.



Detent mechanism designed for crisp, positive action for accurate switch setting.

Bifurcated, spring loaded contacts give unmatched logic-level reliability.

Actual Size

Gull-winged terminals ensure mechanical stability during soldering and simplify solder joint inspection.

Epoxy seal on terminals locks out flux, solvents, and other contaminants.

NKK SERIES ND3 ROTARY SWITCHES

SURFACE MOUNT/BINARY CODED/DIP ROTARY

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	Nonswitching Rating: 100mA @ 50V DC Switching Rating: 100mA @ 5V DC
Contact Resistance:	80 milliohms maximum (circuit) 30 milliohms maximum (contact point)
Insulation Resistance:	1,000 megohms minimum @ 250V DC
Dielectric Strength:	250V AC minimum
Mechanical Life:	20,000 detent operations minimum
Electrical Life:	20,000 detent operations minimum

Note: A detent operation is one actuator position operation or stepping. 20,000 detent operations = 1,250 cycles for hexadecimal devices or 2,000 cycles for decimal devices. A cycle is one 360° rotation.

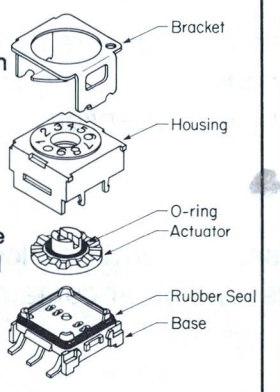
Operating Torque:	50 grams-cm (0.70 ounce-in)
Ambient Temp Range:	-25°C through +75°C (-13°F through +167°F)

MATERIALS & FINISHES

Actuator	Glass fiber reinforced polyamide
Housing	Glass fiber reinforced polyamide
O-ring	Nitrile butadiene rubber
Base	Glass fiber reinforced polyamide
Movable Contact	Beryllium copper with gold plating over nickel
Stationary Contacts	Brass with gold plating over nickel
Terminals	Brass with gold plating over nickel

SEALED BODY CONSTRUCTION

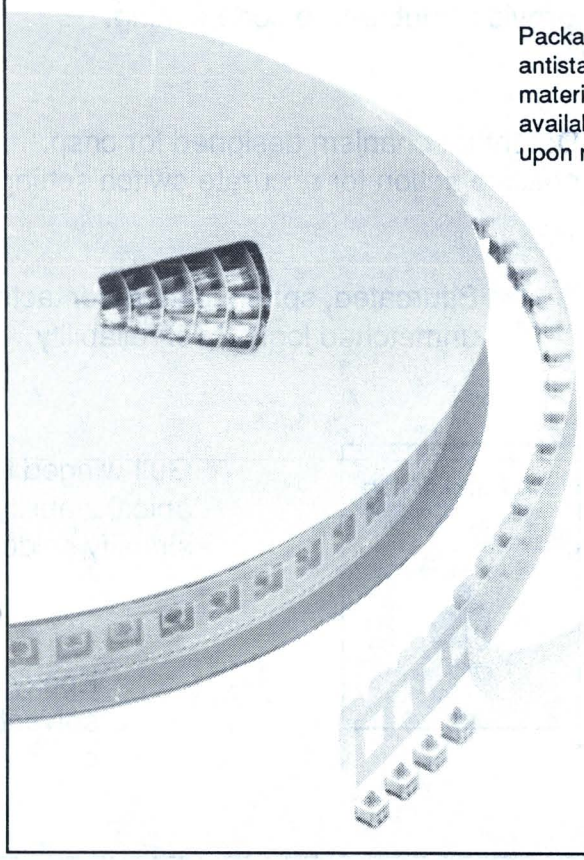
Sealed construction of the ND3 Series DIP rotary switches is accomplished with seals between the actuator and housing and between the housing and base; insert-molded, epoxy-sealed terminals also prevent entry of contaminants. These combined features, plus the heat resistance of the resins and adhesives used in construction, allow the ND3 models to be vaporphase or wave soldered. Alcohol based solvents recommended.



TAPE-REEL PACKAGING

ND3 devices are packaged in a tape-reel 24mm wide and 500 devices per reel. The reel diameter is 330mm (370mm available on request to meet EIA requirements).

Packaging with antistatic material available only upon request.



Rotaries

SMD

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NKK SERIES ND3 ROTARY SWITCHES

SURFACE MOUNT/BINARY CODED/DIP ROTARY

TYPICAL SWITCH ORDERING EXAMPLE

ND3 K C 10 P

ACTUATORS	
F	Screwdriver Actuated
K	Shaft Actuated

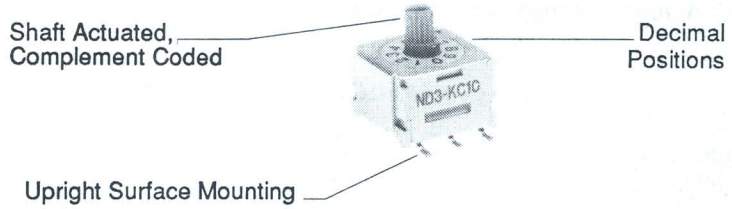
CIRCUITS	
R	Real Coded (white actuator)
C	Complement Coded (red actuator)

POSITIONS	
10	Decimal
16	Hexadecimal

MOUNTING	
P	Upright
B	Upright w/Brkt
H	Right Angle

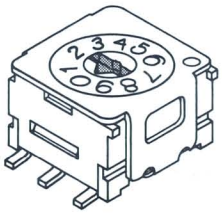
DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (ND3KC10P):

SERIES ND3 ROTARY

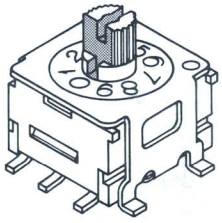


ACTUATORS

F Screwdriver Actuated



K Shaft Actuated



Actuators are fully rotational in either direction. Actuator colors: white for real coded & red for complement coded .

SOLDERING & MOUNTING

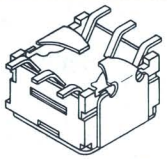
Vapor Phase Reflow Soldering:
60 seconds @ 150°C + 60 seconds @ 215°C
(120 seconds total)
Switches should be left in unheated state at least 10 minutes after soldering before they are washed.

Manual Soldering:
3 seconds @ 350°C or 10 seconds @ 260°C
Eutectic solder is recommended.

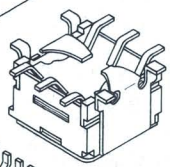
Mounting Note:
It is recommended that the body of models for upright mounting without bracket be fastened to a panel or similar support for protection of solder joints from mechanical stress.

MOUNTING

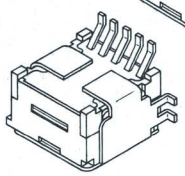
P Upright
Gull-winged terminals



B Upright with Bracket
Gull-winged terminals & bracket



H Right Angle
Gull-winged terminals



TRUTH TABLES

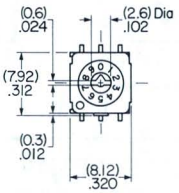
Actuator Positions — **16** Hexadecimal Positions
⊗ = ON — **10** Decimal Positions
Terminal Number (Output)

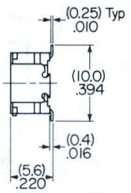
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Real Coded	1		⊗		⊗		⊗		⊗		⊗		⊗		⊗		⊗
	2			⊗	⊗			⊗	⊗			⊗	⊗			⊗	⊗
R Model Numbers: ND3FR & ND3KR	4					⊗	⊗	⊗	⊗					⊗	⊗	⊗	⊗
	8									⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
Complement Coded	1	⊗		⊗		⊗		⊗		⊗		⊗		⊗		⊗	
	2	⊗	⊗			⊗	⊗			⊗	⊗			⊗	⊗		
C Model Numbers: ND3FC & ND3KC	4	⊗	⊗	⊗	⊗					⊗	⊗	⊗	⊗				
	8	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗								

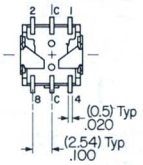
SERIES ND3 ROTARY SWITCHES

SURFACE MOUNT/BINARY CODED/DIP ROTARY

P Screwdriver Actuated/Upright Mounting

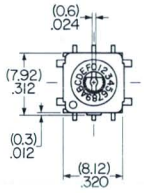


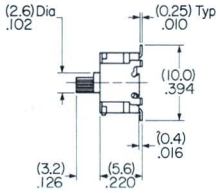


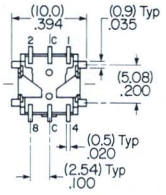


ND3FR10P Model Shown

B Shaft Actuated/Upright Mounting with Bracket

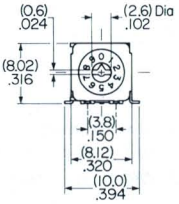


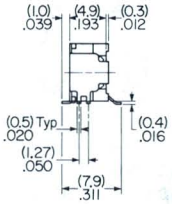


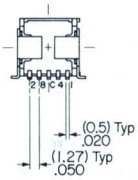


ND3KC16B Model Shown

H Screwdriver Actuated/Right Angle Mounting



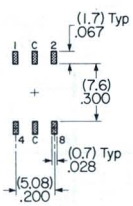




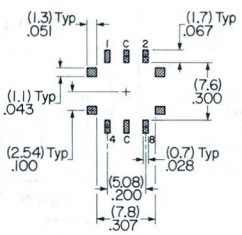
ND3FC10H Model Shown

Pad Layouts for Surface Mount Terminals

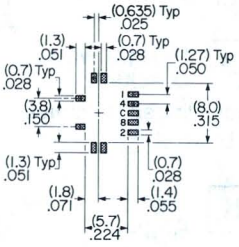
Upright Mounting



Upright Mounting w/Bracket



Right Angle Mounting



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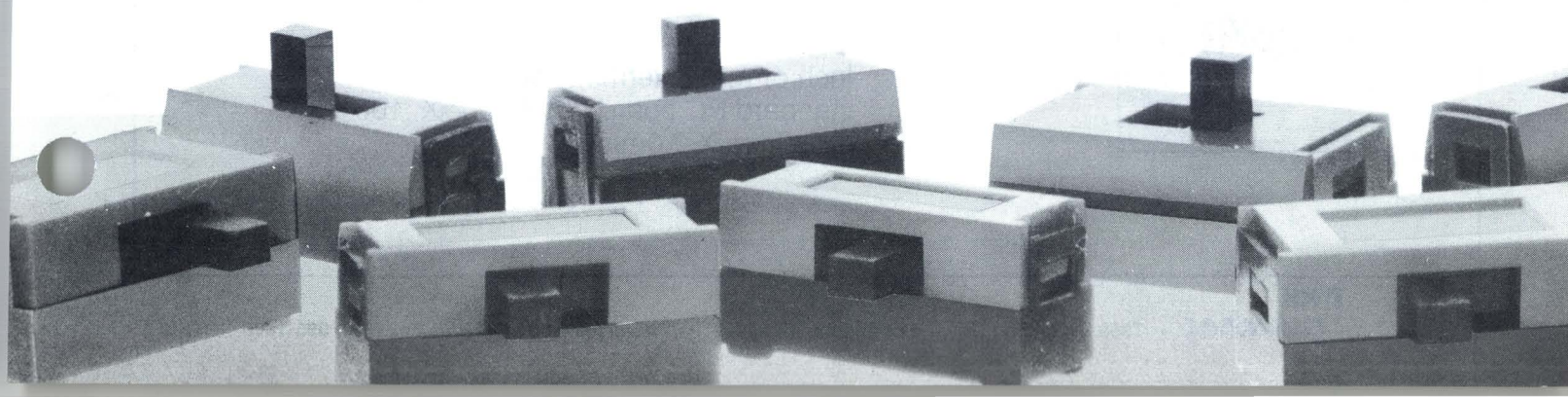
SERIES SS

MICRO-SUBMINIATURE SLIDE SWITCHES



NKK SERIES SS

MICRO-SUBMINIATURE/LOGIC LEVEL/PCB MOUNTING

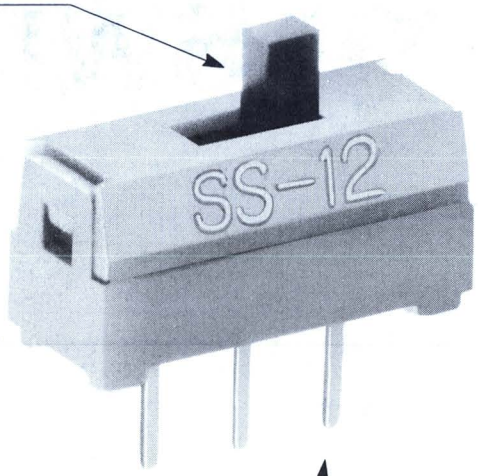
DISTINCTIVE FEATURES

Bright & uniform illumination in models with LED in actuator.

Compact dimensions (.354" maximum width, .622" maximum length & .275" maximum from PCB to top) allow for high density mounting.

Top or side actuation permits flexible board design.

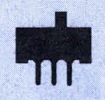
Crisp actuation positively indicates circuit status.



Double molded thermoset base and thermoplastic housing prevent loosening of terminals due to high soldering temperatures.

Sliding twin contact mechanism with self-cleaning action provides smooth actuation and produces high contact reliability.

Actual Size



Insert molded terminals lock out flux, solvents, and other contaminants.

Inch or metric terminal spacing for standard PC board grid (.100" X .100" or 2.0mm X 2.0mm).

Slides

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NKK SERIES SS SLIDE SWITCHES

MICRO-SUBMINIATURE/LOGIC LEVEL/PCB MOUNTING

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	0.1A @ 30V DC
Contact Resistance:	20 milliohms maximum
Insulation Resistance:	100 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	10,000 operations minimum
Electrical Life:	10,000 operations minimum
Total Travel:	2.0mm (.079") approximate
Ambient Temp Range:	-10°C through +60°C (+14°F through +140°F)

MATERIALS & FINISHES

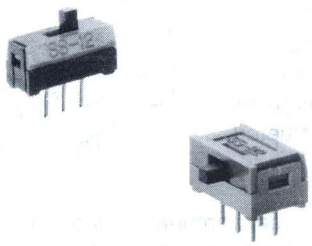
Actuator	Polyacetal (Polyamide for 3-on models)
Upper Case	Polyacetal
Lower Case	Fiberglass reinforced polybutylene terephthalate (thermoplastic); fiberglass reinforced polyacetal for illuminated & 3-on models
Movable Contactor	Phosphor bronze with silver plating
Interior Base	Phenolic resin (thermoset)
End Contact	Brass with silver plating over copper undercoating
Terminals	Brass with silver plating over copper undercoating

APPLICATIONS

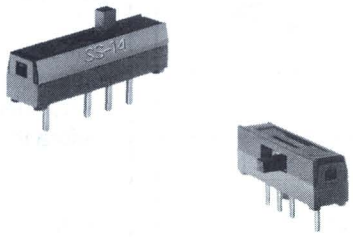
NKK's logic level slide switches are designed with economy and user convenience in mind. The SS Series is specifically constructed for low current circuitry and provides a 0.1A rating. These double throw devices have shorting (make-before-break) contacts and are available in single or double pole models. Top or side actuation may be combined with either inch (.100" X .100") or metric (2.0mm X 2.0mm) PC terminal spacing which conforms to standard PC board grid.

SS Series micro-subminiature switches are especially well suited for use in low energy systems and applications with limited space requirements. Typical applications include: small electronic appliances and games, calculators, portable medical devices, telecommunications equipment and other hand held electronic devices.

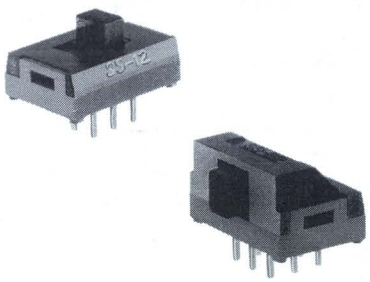
STANDARD ON-NONE-ON



THREE-ON



LED ILLUMINATED



SERIES SS SLIDE SWITCHES

MICRO-SUBMINIATURE/LOGIC LEVEL/PCB MOUNTING

TYPICAL SWITCH ORDERING EXAMPLE

SS | 12 | S | D | P | 2 | — | | |

POLES & CIRCUITS

12	SPDT	ON	NONE	ON
14	SP3T	ON	ON	ON
22	DPDT	ON	NONE	ON

(Illuminated w/3-on not available)

TERMINAL SPACING

B	Metric 2.0mm X 2.0mm
D	Inch .100" X .100"

Illuminated available w/inch spacing only

CONTACT MATERIAL

2	Silver over Brass

CONTACTS

S	Shorting
*	See notes below.

ACTUATION

P	Top Actuated
H	Side Actuated

LED CIRCUIT

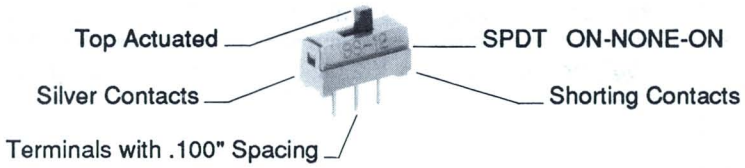
L	Isolated

LED COLORS

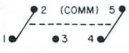
C	Red
E	Yellow
F	Green

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (SS12SDP2):

SERIES SS SLIDE SWITCH



POLES AND CIRCUITS

POLE & THROW	MODEL	SLIDE POSITION & TERMINAL NUMBERS: Up	Center	Down
SPDT	SS12	ON	NONE	ON
CONNECTED TERMINALS		2-1	OPEN	2-3
SCHEMATIC				LED circuit is isolated & requires external switch.
SP3T	SS14	ON	ON	ON
CONNECTED TERMINALS		3-4	3-2	3-1
SCHEMATIC				
DPDT	SS22	ON	NONE	ON
CONNECTED TERMINALS		2-1 5-4	OPEN	2-3 5-6
SCHEMATIC				LED circuit is isolated & requires external switch.

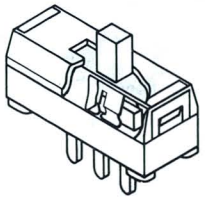
Terminal numbers are not actually on the switch. * Note: ON-OFF-ON circuit can be created by not connecting terminal 2 of the **SS14** model.

CONTACTS

S **Shorting (Make-before-break)**
See note below.

SS series slide switches employ a twin contact mechanism in which two movable contacts slide along the stationary contacts to provide excellent contact stability and increased operating life. Contact reliability is assured since the contacts are wiped clean with each actuation.

The shorting contact feature means that in this double throw switch one circuit is completed before the other is interrupted.



* Note: Switching between terminals 4 and 2 is nonshorting and between terminals 2 and 1 is shorting, thus giving the option of creating an ON-OFF-ON circuit.

Slides

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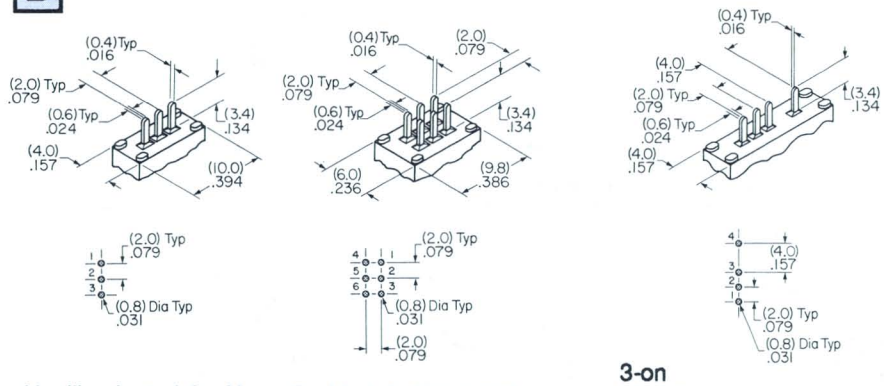
NKK SERIES SS SLIDE SWITCHES

MICRO-SUBMINIATURE/LOGIC LEVEL/PCB MOUNTING

TERMINAL SPACING FOR NONILLUMINATED

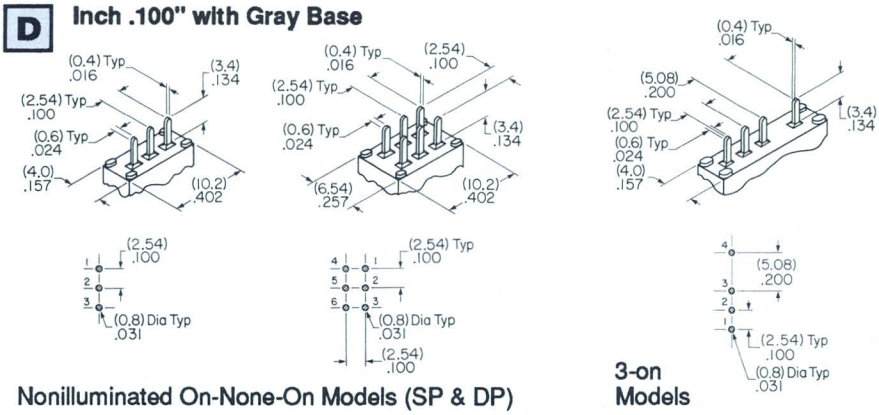
B **Metric 2.0mm with Black Base**



Nonilluminated On-None-On Models (SP & DP)

3-on Models

D **Inch .100" with Gray Base**



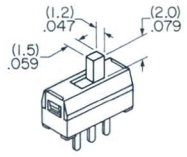
Nonilluminated On-None-On Models (SP & DP)

3-on Models

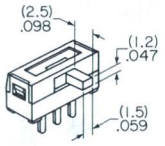
Dimensions for Illuminated models on following page.

ACTUATION

P **Top Actuated**



H **Side Actuated**



CONTACT MATERIAL & RATING

2 **Silver over Brass**
Rated 0.1A @ 30V DC

SOLDERING LIMITS

3 seconds @ 350°C

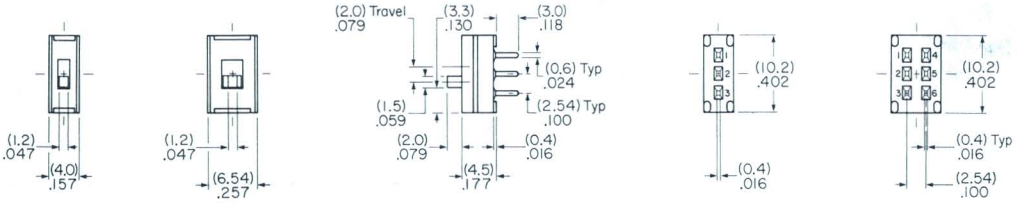
5 seconds @ 270°C

5 seconds @ 250°C
for plated-through holes

Slides

Top Actuated/Single & Double Pole

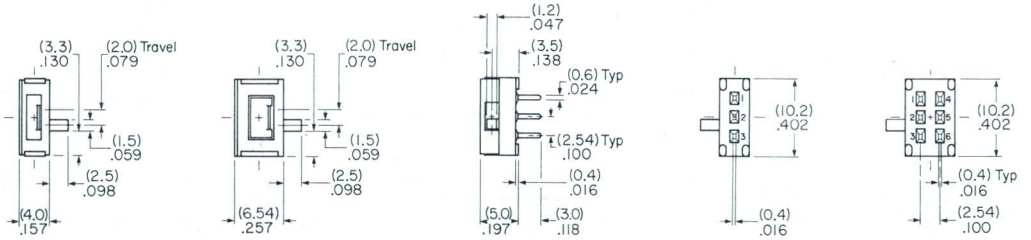
SS12SDP2 Model Shown



Actuator in DOWN position.

Side Actuated/Single & Double Pole

SS12SDH2 Model Shown

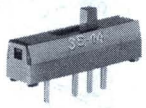


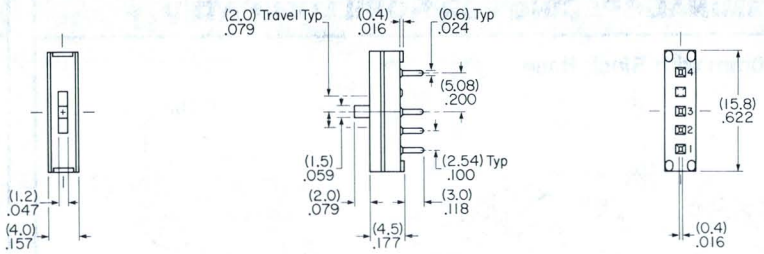
Actuator in DOWN position.

NKK SERIES SS SLIDE SWITCHES

MICRO-SUBMINIATURE/LOGIC LEVEL/PCB MOUNTING

3-On Circuit/Top Actuated/ Single Pole

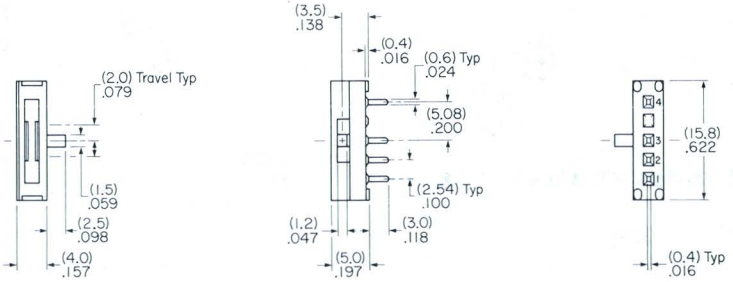




SS14SDP2 Model Shown

Actuator in CENTER position.

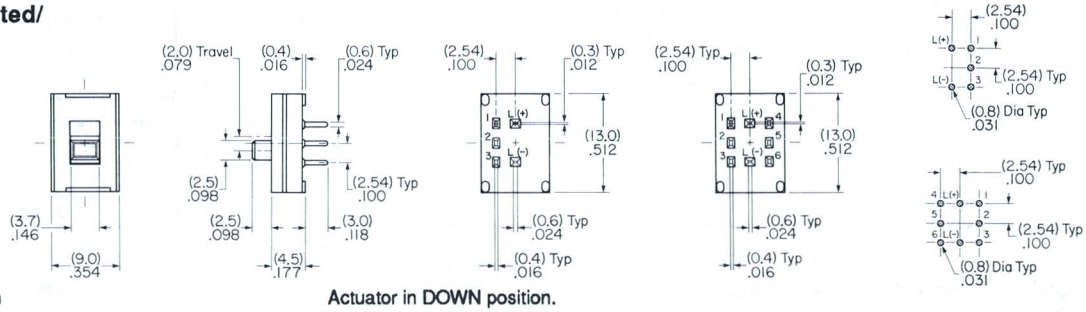
3-On Circuit/Side Actuated/ Single Pole



SS14SDH2 Model Shown

Actuator in CENTER position.

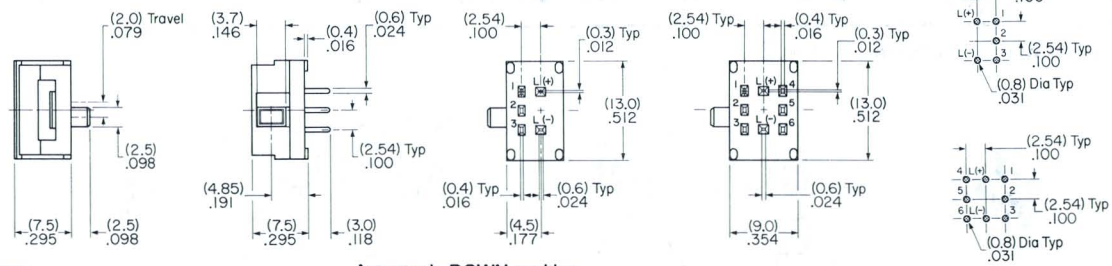
Illuminated/Top Actuated/ Single & Double Pole



SS22SDP2-LC Model Shown

Actuator in DOWN position.

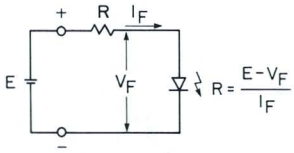
Illuminated/Side Actuated/Single & Double Pole



SS12SDH2-LC Model Shown

Actuator in DOWN position.

ELECTRICAL SPECIFICATIONS FOR SINGLE ELEMENT LED



Where: R = Resistor Value (Ohms)
E = Source Voltage (V)
V_F = Forward Voltage (V)
I_F = Forward Current (mA)

		Red	Yellow	Green
Forward Peak Current	I_{FM}	20mA	20mA	20mA
Continuous Forward Current	I_F	16mA	16mA	16mA
Forward Voltage	V_F	2.07V	2.15V	2.16V
Reverse Peak Voltage	V_{RM}	3V	4V	4V
Current Reduction Rate Above 25°C	ΔI_F	0.27mA/°C	0.27mA/°C	0.27mA/°C

The electrical specifications shown above are determined at a basic temperature of 25°C. If the source voltage exceeds the LED's rated voltage, the required ballast resistor value can be calculated by using the accompanying formula.

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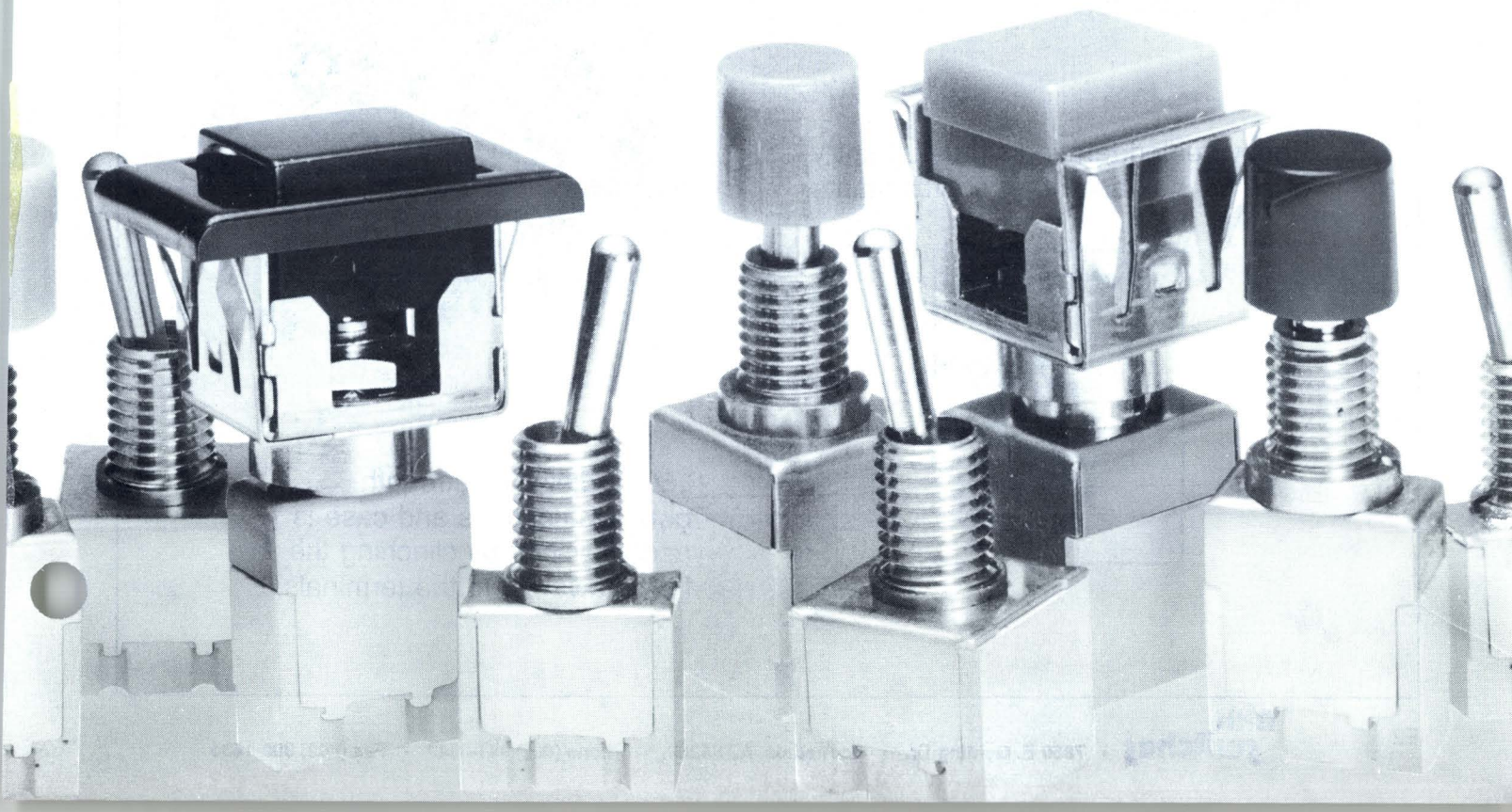
SERIES E

3 AMP SUBMINIATURE SWITCHES

● TOGGLES ● PUSHBUTTONS



NKK SERIES E

SUBMINIATURE/LIGHT DUTY/PANEL MOUNTABLE

DISTINCTIVE FEATURES

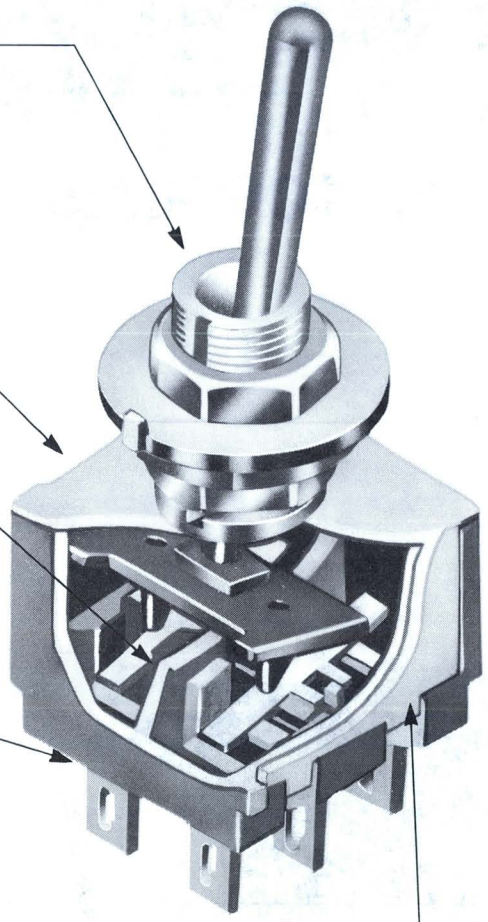
3 amp rating for AC makes E Series devices suited to light duty applications.

The high torque bushing prevents the bushing from rotating or separating from the metal frame during installation.

The stainless steel frame resists corrosion.

Insulating barriers, higher than standard, protect against crossover in multipole devices.

Epoxy sealed terminals prevent entry of solder flux and other contaminants.



Actual Size

1500V dielectric strength between contacts and case is accomplished by clinching the frame away from the terminals.

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NKK SERIES E

SUBMINIATURE/LIGHT DUTY/PANEL MOUNTABLE

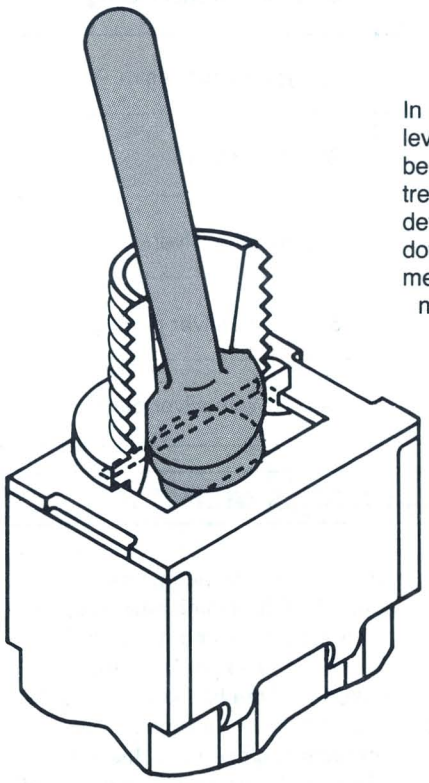
APPLICATIONS

● Toggles ● Pushbuttons

The E Series toggle switches combine maximum performance characteristics with small size and light weight. The small size is ideal for miniaturized equipment with space limitations. The toggles have a slow-make, slow-break contact mechanism and are suited for AC applications. The pushbutton models offer extremely light operation and a variety of decorative accessories.

The majority of circuits in both single and double pole devices have UL recognition. In most circuits of the single pole solder lug devices and the single and double pole PC models, CSA certification applies. For exact model numbers see the UL and CSA tables contained in the supplement at the end of this catalog.

ANTIJAMMING DESIGN



In some applications where a lever may suffer sharp blows or be subjected to other harsh treatment, contacts can be deformed by the transmission of downward force to the contact mechanism. Protection against mechanism damage is designed into the E Series toggle switches.

Beneath the toggle joint is a step which rests against the frame of the switch. When downward force is applied to the lever, the frame and step resist movement of the lever and protect the contact mechanism.

TOGGLES

Internal construction prevents switch failure due to biased lever movement

Solder lug and PC terminals

Single pole and double pole in 5 most widely used circuits

Bat lever and threaded metric bushing only

Minimal contact bounce

PUSHBUTTONS

Extremely light operation with positive detent

Single pole or double pole momentary and alternate action circuits

Bushing or snap-in mounting

Adjustable button height with snap-in mounter

Solder lug and PC terminals

Minimal contact bounce

NKK SERIES E TOGGLE SWITCHES

SUBMINIATURE/LIGHT DUTY/PANEL MOUNTABLE

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	3A @ 125V AC for silver contacts
Contact Resistance:	10 milliohms max for silver
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts & case
Mechanical Life:	100,000 operations minimum
Electrical Life:	20,000 operations minimum for silver
Ambient Temp Range:	-10°C through +85°C (+14°F through +185°F)
Toggle Angle of Throw:	25°

NOMINAL OPERATING FORCE IN GRAMS

	Momentary	Alternate
E2011		160
E2012		170
E2013		460
E2015	390	
E2018	390	
E2019	490	400
E2022		200
E2023		540
E2025	410	
E2028	620	
E2029	510	600

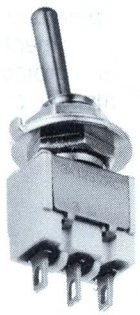
MATERIALS & FINISHES

Toggle	Brass with chrome plating
Bushing	Brass with nickel plating
Case	Diallyphthalate resin
Frame	Stainless steel
Movable Contacts	Copper with silver
Stationary Contacts	Silver with silver plating
Terminals	Copper with silver plating

BIAS GUARD

When the lever is pushed in a diagonal direction instead of the mechanism's direction of operation, the biased movement is transmitted to the actuator block and causes misalignment of the contacts. However, internal construction of the E Series case prevents this biased movement.

DIELECTRIC STRENGTH



The superior dielectric strength found in NKK's miniature switches is an accomplishment supporting the unchanging goal to build switches of the highest quality. The 1500V dielectric strength between contacts and case is achieved by clinching the frame to the case well above the base and terminals.

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NKK SERIES E TOGGLE SWITCHES

SUBMINIATURE/LIGHT DUTY/PANEL MOUNTABLE

TYPICAL SWITCH ORDERING EXAMPLE

E20 2 2 P - C G

POLES	
1	SPST SPDT
2	DPDT

TERMINALS & CONTACT MATERIALS	
NO CODE	Silver Solder Lug 3A @ 125V AC
P	Silver Straight PC 3A @ 125V AC

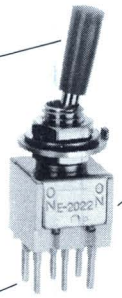
CIRCUITS			
1	ON	NONE	OFF
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
( ) = Momentary			

CAPS	
B	Bat Lever Cap
C	Bat Lever Conical Cap

COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (E2022P-CG)

SERIES E TOGGLE



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

NKK SERIES E TOGGLE SWITCHES

SUBMINIATURE/LIGHT DUTY/PANEL MOUNTABLE

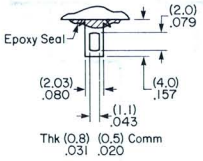
POLES AND CIRCUITS

POLE & THROW	MODEL	TOGGLE POSITION & TERMINAL NUMBERS (Momentary) Down	Center	Up
SPST	E2011	ON	NONE	OFF
CONNECTED TERMINALS		2-3	OPEN	OPEN
SCHEMATIC			2 (COMM) •3	
SPDT	E2012	ON	NONE	ON
	E2013	ON	OFF	ON
	E2015	ON	NONE	(ON)
	E2018	(ON)	OFF	(ON)
	E2019	ON	OFF	(ON)
CONNECTED TERMINALS		2-3	OPEN	2-1
SCHEMATIC			1 2 (COMM) •3	
DPDT	E2022	ON	NONE	ON
	E2023	ON	OFF	ON
	E2025	ON	NONE	(ON)
	E2028	(ON)	OFF	(ON)
	E2029	ON	OFF	(ON)
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4
SCHEMATIC			1 2 (COMM) 5 •3 4 •6	

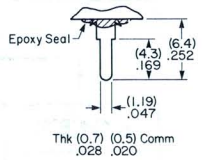
Terminal numbers are not actually on the switch.

TERMINALS & CONTACT MATERIALS

NO CODE **Silver Solder Lug 3A @ 125V AC**



P **Silver Straight PC 3A @ 125V AC**



PCB Footprints

Single Pole **Double Pole**

Wiring & Soldering

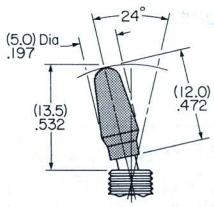
The 0.79" X 0.43" oval hole accommodates 1 solid 18-gauge or 2 solid or stranded 20-gauge wires.

Soldering Limits:
3 seconds @ 350°C
5 seconds @ 270°C.

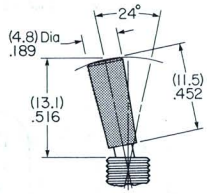
LEVER CAPS

Lever Cap Material: Polyethylene
Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue

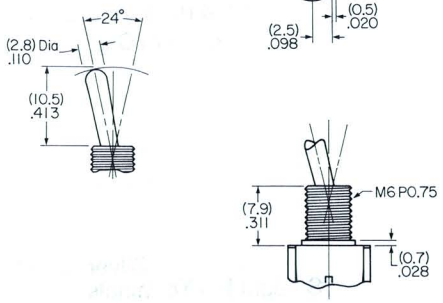
B **AT415 Bat Lever Cap**



C **AT444 Bat Lever Conical Cap**



STANDARD TOGGLE & METRIC BUSHING



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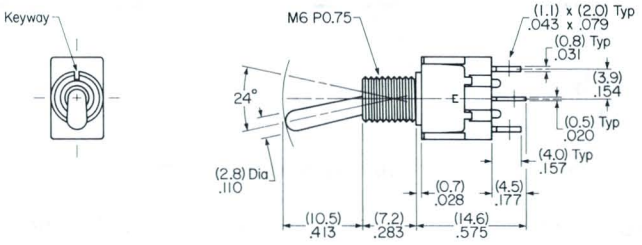
NKK SERIES E TOGGLE SWITCHES

SUBMINIATURE/LIGHT DUTY/PANEL MOUNTABLE

Solder Lug Terminals/Single Pole

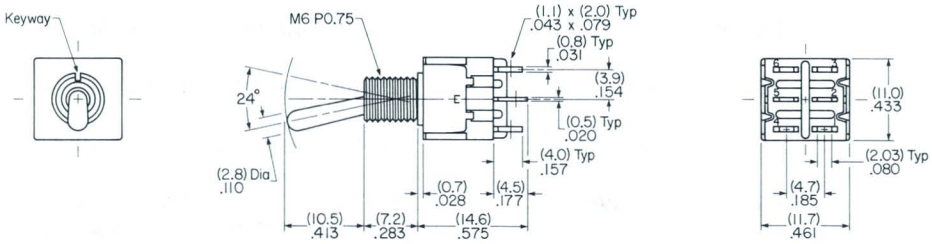
E2012 Model Shown



E2011 model does not have terminal 1.

Solder Lug Terminals/Double Pole

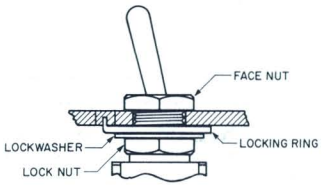
E2022 Model Shown



E2021 model does not have terminals 1 & 4.

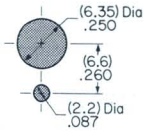
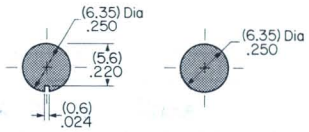
STANDARD HARDWARE

AT513M Metric Hexagon Nut
AT507M Metric Locking Ring
AT509 Internal Tooth Lockwasher



Optional Hardware Available:
Knurled nuts, dress nuts,
ON-OFF plates, & waterproof boot

PANEL THICKNESSES & PANEL CUTOUTS

Hardware:	W/Standard Hardware	Without Locking Ring
Maximum Effective Panel Thickness:	2.2mm (.087")	3.0mm (.118")
Cutout:		
Hardware:	Without Bottom Hex Nut	Without Locking Ring & Bottom Hex Nut
Maximum Effective Panel Thickness:	3.9mm (.154")	4.7mm (.185")

NKK SERIES E PUSHBUTTON SWITCHES

LIGHT TOUCH/MOMENTARY & ALTERNATE ACTION

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	3A @ 125V AC
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts & case
Mechanical Life:	100,000 operations minimum
Electrical Life:	25,000 operations minimum
Ambient Temp Range:	-10°C through +85°C (+14°F through +185°F)
Average Pretravel:	0.47mm (.019") for Momentary 1.5mm (.059") for Alternate Action
Average Overtravel:	1.13mm (.044") for Momentary 0.7mm (.028") for Alternate Action
Average Total Travel:	1.6mm (.063") for Momentary 2.2mm (.087") for Alternate Action
Nominal Operating Force:	EB2011 240 grams EB2061 300 grams EB2065 270 grams EB2085 370 grams

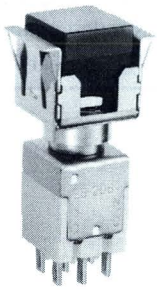
MATERIALS AND FINISHES

Plunger (Momentary)	Brass with chrome plating
Plunger (Alternate)	Brass with nickel plating
Bushing	Brass with nickel plating
Case	Diallylphthalate resin
Frame	Stainless steel
Snap-in Frame	Stainless steel
Movable Contacts	Copper with silver
Stationary Contacts	Silver with silver
Terminals	Copper with silver

BUSHING MOUNTED

The appearance of the bushing mounted pushbuttons can be varied by the use of either a small or large cap in 7 color selections or by the use of optional mounting collars.

SNAP-IN MOUNTED



The snap-in mounted pushbutton is offered with 6 cap colors, variation in cap rise, and 4 bezel types in various colors.

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NKK SERIES E PUSHBUTTON SWITCHES

LIGHT TOUCH/MOMENTARY & ALTERNATE ACTION

TYPICAL SWITCH ORDERING EXAMPLE

EB20 65 ☐ - B F

POLES & CIRCUITS

11	SPDT	ON	(ON)
65	SPDT	ON	ON
61	DPDT	ON	(ON)
85	DPDT	ON	ON

( ) = Momentary

CAPS

B	.315" Diameter
C	.394" Diameter

TERMINALS & CONTACT MATERIALS

NO CODE	Silver Solder Lug 3A @ 125V AC
P	Silver Straight PC 3A @ 125V AC

COLORS

A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (EB2065-BF)

SERIES E PUSHBUTTON

Green .315" Diameter Cap

SPDT ON-ON Circuit

Silver Solder Lug Terminals

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

Pushbuttons

NKK SERIES E PUSHBUTTON SWITCHES

LIGHT TOUCH/MOMENTARY & ALTERNATE ACTION

POLES AND CIRCUITS

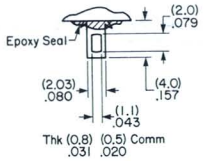
POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS (Momentary) Normal	Down
SPDT	EB2011	ON	(ON)
	EB2065	ON	ON
CONNECTED TERMINALS		2-3	2-1
SCHEMATIC		1 2 (COMM) 3	
DPDT	EB2061	ON	(ON)
	EB2085	ON	ON
CONNECTED TERMINALS		2-3 5-6	2-1 5-4
SCHEMATIC		1 2 (COMM) 3 4 5 6	

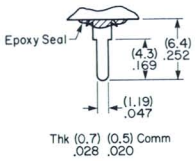
Terminal numbers are not actually on the switch.

TERMINALS & CONTACT MATERIALS

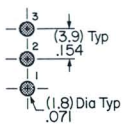
NO CODE Silver Solder Lug 3A @ 125V AC

P Silver Straight PC 3A @ 125V AC

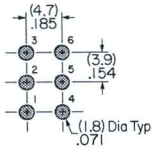




PCB Footprints



Single Pole



Double Pole

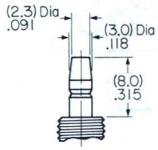
WIRING & SOLDERING

The 0.79" X 0.43" oval hole accommodates 1 solid 18-gauge or 2 solid or stranded 20-gauge wires.

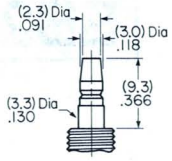
Soldering Limits: 3 sec. @ 350°C; 5 sec. @ 270°C.

PLUNGER & METRIC BUSHING

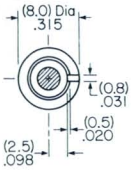
Momentary



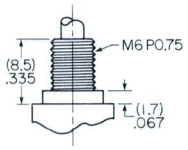
Alternate Action



Contact factory when ordering both momentary and alternate action devices which are to be combined in a panel and mounted to a PC board. In such a case, a special bushing/plunger combination will be provided to achieve uniform cap height.



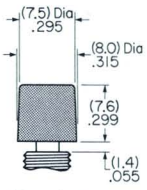
Metric Bushing



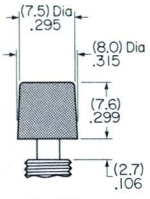
PLUNGER CAPS

Cap Material: Polycarbonate
Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

B **AT443**
.315" Dia. Snap-on Cap

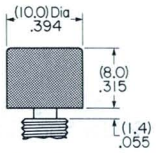


Momentary

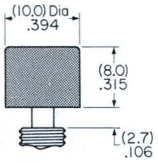


Alternate

C **AT442**
.394" Dia. Snap-on Cap



Momentary



Alternate

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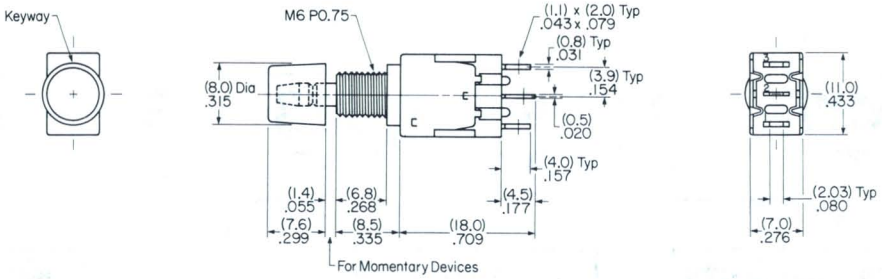
NKK SERIES E PUSHBUTTON SWITCHES

LIGHT TOUCH/MOMENTARY & ALTERNATE ACTION

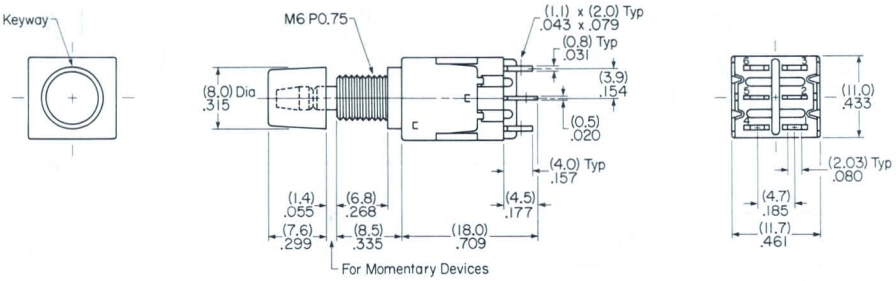
Solder Lug Terminals/Single Pole

EB2011-BA Model Shown



Solder Lug Terminals/Double Pole

EB2061-BA Model Shown

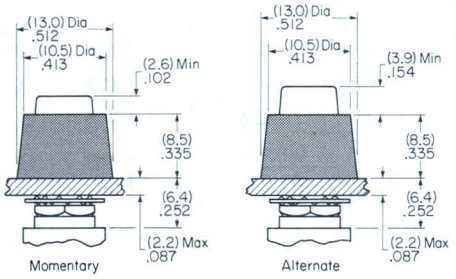


OPTIONAL MOUNTING COLLARS

AT512M
Metric Conical Nut

Used with
B Cap AT443

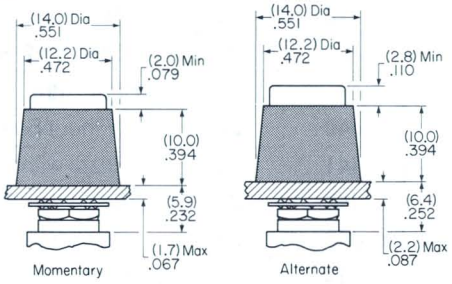
Brass, chrome plating



AT512CM
Metric Conical Nut

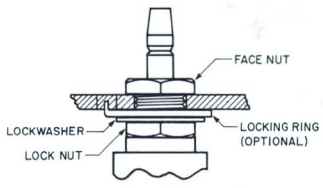
Used with
C Cap AT442

Brass, chrome plating



PANEL MOUNTING ASSEMBLY

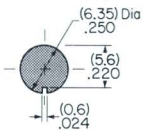
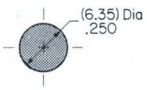
Standard hardware:
2 AT513M Metric Hexagon Nuts
1 AT509 Internal Tooth Lockwasher



Optional Hardware: Locking ring AT507M and Knurled nut AT501M

Note: The cap must be snapped on after the switch is mounted into the panel.

PANEL THICKNESSES & PANEL CUTOUTS

Hardware:	With Standard Hardware	W/O Bottom Hex Nut
Max Effective Panel Thickness:	3.0mm (.118")	4.7mm (.185")
Cutout:		

NKK SERIES E PUSHBUTTON SWITCHES

SNAP-IN/LIGHT TOUCH/MOMENTARY & ALTERNATE

TYPICAL SWITCH ORDERING EXAMPLE

EB20 11 P — J23 B — A FE

POLES & CIRCUITS			
11	SPDT	ON	(ON)
65	SPDT	ON	ON
61	DPDT	ON	(ON)
85	DPDT	ON	ON
( ) = Momentary			

TERMINALS	
NO CODE	Silver Solder Lug 3A @ 125V AC
P	Silver Straight PC 3A @ 125V AC

BEZEL COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

Bezels for J22, J23, J24, J32, J33, J34, J42, J43, J44, J52, J53, & J54 available in black only.

SNAP-IN MOUNTER & CAP		
Momentary	Alternate	Description
Low Rise		
J20	J30	Without Bezel
J21	J31	Bezel without LED
J22	J32	Bezel W/1 Round LED
J23	J33	Bezel W/2 Round LEDs
J24	J34	Bezel W/2 Rectangular LEDs
High Rise		
J40	J50	Without Bezel
J41	J51	Bezel without LED
J42	J52	Bezel W/1 Round LED
J43	J53	Bezel W/2 Round LEDs
J44	J54	Bezel W/2 Rectangular LEDs

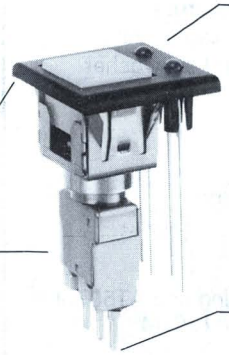
CAP COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue

LED COLORS	
C	Red
CF	Red/Green
CE	Red/Yellow
CC	Red/Red
FE	Green/Yellow
FF	Green/Green
EE	Yellow/Yellow

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (EB2011P-J23B-AFE):

SERIES EB SNAP-IN PUSHBUTTON

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.



Note: See previous pushbutton section for applicable general specifications and for materials and finishes.

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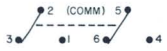
NKK SERIES E PUSHBUTTON SWITCHES

LIGHT TOUCH/MOMENTARY & ALTERNATE ACTION

POLES AND CIRCUITS

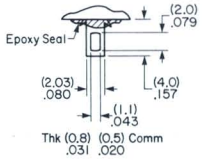
POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS (Momentary) Normal (Keyway)	Down
SPDT	EB2011 EB2065	ON ON	(ON) ON
CONNECTED TERMINALS		2-3	2-1
SCHEMATIC			
DPDT	EB2061 EB2085	ON ON	(ON) ON
CONNECTED TERMINALS		2-3 5-6	2-1 5-4
SCHEMATIC			

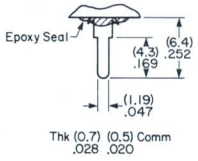
Terminal numbers are not actually on the switch.

TERMINALS & CONTACT MATERIALS

NO CODE Silver Solder Lug 3A @ 125V AC

P Silver Straight PC 3A @ 125V AC





SNAP-IN MOUNTER AND SNAP-ON CAP

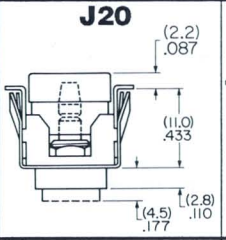
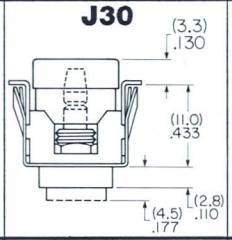
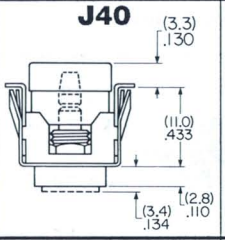
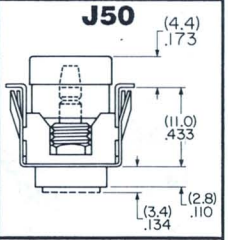
The square, snap-on cap and snap-in mounter are factory assembled on the switch. From the following table, the customer must select the desired dimension and code for cap extension. Cap extension varies according to the choice of momentary or alternate action circuits and the use of a bezel. In addition, a variety of cap, bezel, and LED colors are available. Details of the fully assembled switch with mounter and cap are shown in the dimensioned drawings at the end of this pushbutton section.

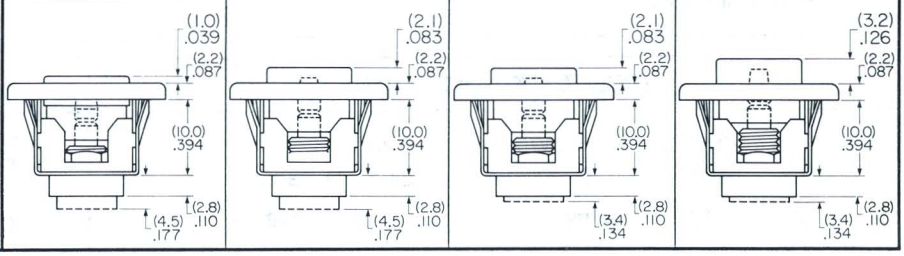
Cap Material: Polycarbonate

Standard Cap Finish: Shiny
Contact factory for matte finish.

Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue

DIMENSIONS FOR CAP EXTENSION

CAP/MOUNTER DESCRIPTION	LOW RISE Momentary	LOW RISE Alternate Action*	HIGH RISE Momentary	HIGH RISE Alternate Action*
Without Bezel	**J20** 	**J30** 	**J40** 	**J50** 
With Bezel Without LED	**J21**	**J31**	**J41**	**J51**
With Bezel With 1 Round LED	**J22**	**J32**	**J42**	**J52**
With Bezel With 2 Round LEDs	**J23**	**J33**	**J43**	**J53**
With Bezel With 2 Rectangular LEDs	**J24**	**J34**	**J44**	**J54**



***Note:**
When alternate action and momentary devices are combined on a panel where the same dimension for cap extension is desired, order both switches with the same J code. Example: EB2011-J52B-AC and EB2065-J52B-AC. Both types of devices will then be the alternate action height shown here.

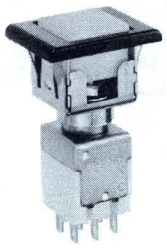
NKK SERIES E PUSHBUTTON SWITCHES

SNAP-IN/LIGHT TOUCH/MOMENTARY & ALTERNATE

BEZELS AND LEDS

Assembled with

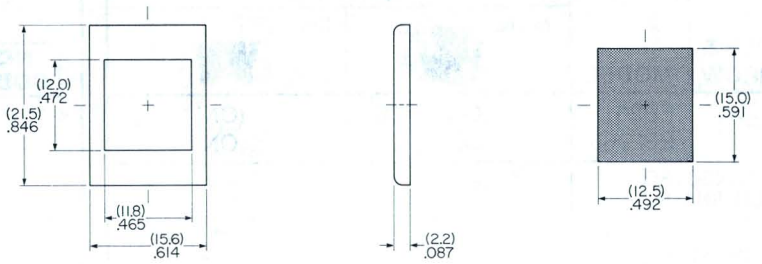
J21
J31
J41
J51



AT207
Bezel without LED

Polycarbonate

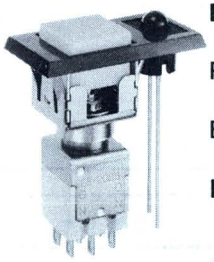
Colors:
A B C E F G H



EB2061-J21B-A Model Shown

Assembled with

J22
J32
J42
J52

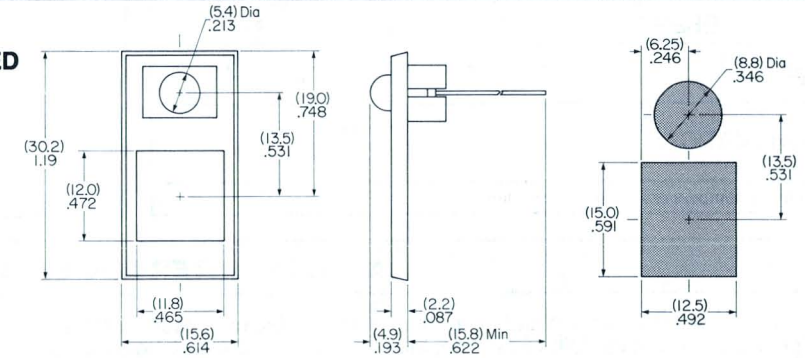


AT208
Bezel with AT070 LED

Polycarbonate

Bezel Color: A

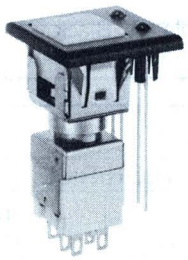
LED Colors: C, F



EB2085-J32B-AC Model Shown

Assembled with

J23
J33
J43
J53

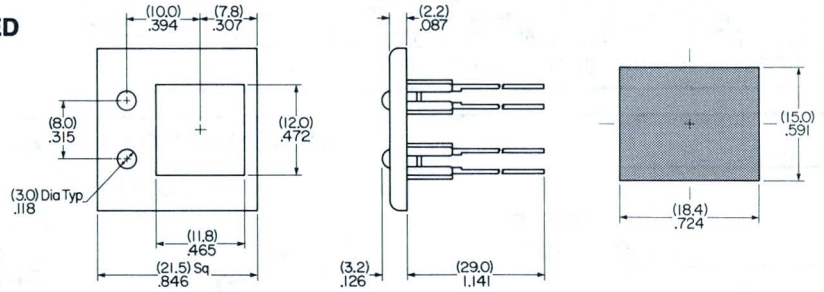


AT212
Bezel with AT617 LED

Polycarbonate

Bezel Color: A

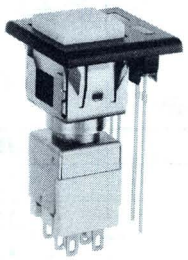
LED Color Combinations:
CF CE CC FE FF EE



EB2061-J23B-AFE Model Shown

Assembled with

J24
J34
J44
J54

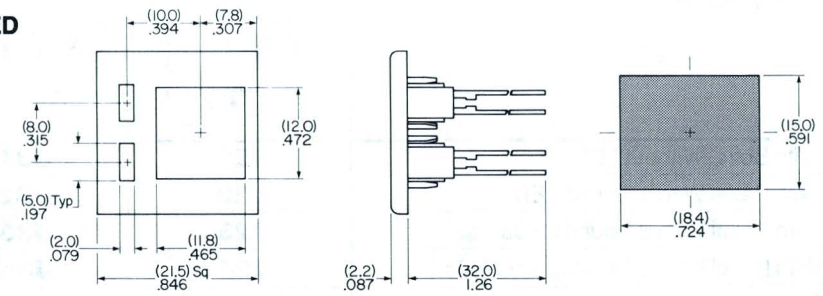


AT213
Bezel with AT618 LED

Polycarbonate

Bezel Color: A

LED Color Combinations:
CF CE CC FE FF EE



EB2085-J34B-AFE Model Shown

BEZEL COLOR CODES	LED COLOR CODES
A Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray Standard finish is shiny. Contact the factory for matte finish.	**C** Red **CC** Red/Red **F** Green **FE** Green/Yellow **CF** Red/Green **FF** Green/Green **CE** Red/Yellow **EE** Yellow/Yellow

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NKK SERIES E PUSHBUTTON SWITCHES

SNAP-IN/LIGHT TOUCH/MOMENTARY & ALTERNATE

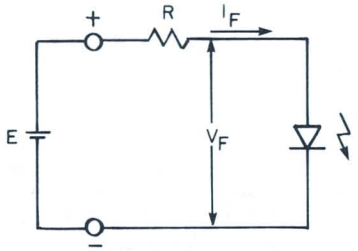
LED LAMP SPECIFICATIONS

		AT070		AT617			AT618		
Color Code		C	F	C	E	F	C	E	F
Lamp Color		Red	Green	Red	Yellow	Green	Red	Yellow	Green
Forward Peak Current	I_{FM}	25mA	30mA	30mA	20mA	30mA	10mA	20mA	30mA
Continuous Forward Current	I_F	20mA	20mA	24mA	16mA	24mA	8mA	16mA	24mA
Forward Voltage	V_F	2.8V	2.2V	2.01V	1.96V	1.95V	1.9V	1.9V	2.0V
Reverse Peak Voltage	V_{RM}	4V	4V	5V	4V	5V	5V	4V	5V
Current Reduction Rate Above 25°C	ΔI_F	0.33 mA/°C	0.40 mA/°C	0.40 mA/°C	0.27 mA/°C	0.40 mA/°C	0.13 mA/°C	0.27 mA/°C	0.40 mA/°C
Ambient Temperature Range (in bezel)		-10°C ~ +70°C		-15°C ~ +70°C			-15°C ~ +70°C		

The electrical specifications shown above are determined at a basic temperature of 25°C.

USE OF BALLAST RESISTOR

If the source voltage is greater than the rated voltage of the lamp or LED, a ballast resistor must be connected in series with the lamp. The circuit diagram and formula will assist in calculating the value of the required ballast resistor.



$$R = \frac{E - V_F}{I_F}$$

Where E = Source Voltage
R = Resistor Value (Ohms)
V_F = Forward Voltage (V)
I_F = Current (mA)

For additional information, see table of lamp resistor values at the end of the catalog.

WIRING SPECS

Solder lug terminals have a .079″ x .043″ oval hole which accommodates 1 solid or stranded 18-gauge wire, or 2 solid or stranded 20-gauge wires.

SOLDERING LIMITS

3 seconds at 350°C 5 seconds at 270°C

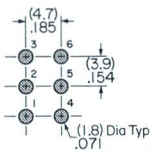
MAXIMUM EFFECTIVE PANEL THICKNESS

With Bezel	1.0mm ~ 3.2mm	(.039″ ~ .126″)
Without Bezel	1.0mm ~ 4.0mm	(.039″ ~ .157″)

PCB FOOTPRINTS

Single Pole

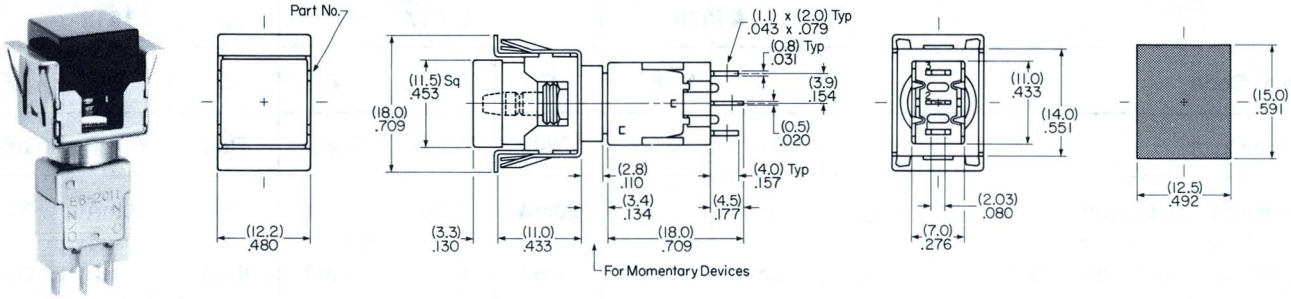
Double Pole



NKK SERIES E PUSHBUTTON SWITCHES

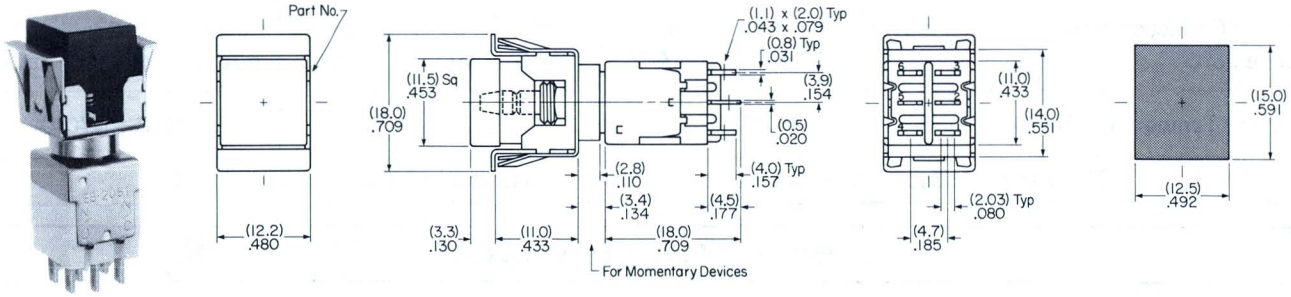
SNAP-IN/LIGHT TOUCH/MOMENTARY & ALTERNATE

Solder Lug/Single Pole/Without Bezel/High Rise



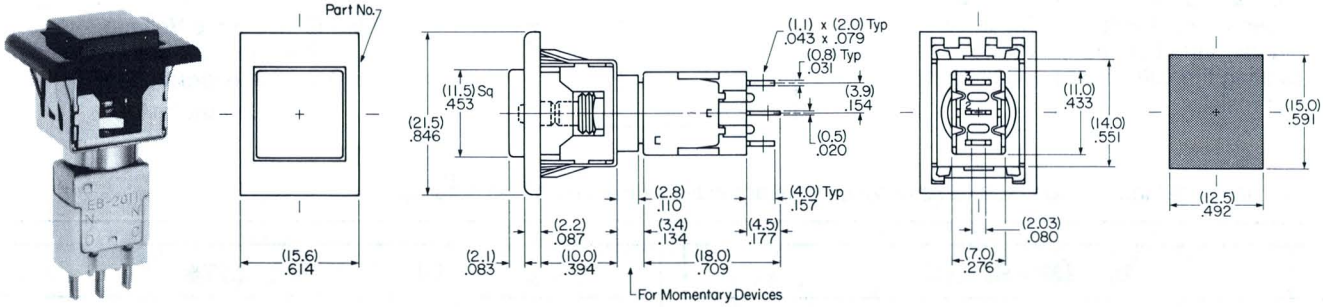
EB2011-J40A Model Shown

Solder Lug/Double Pole/Without Bezel/High Rise



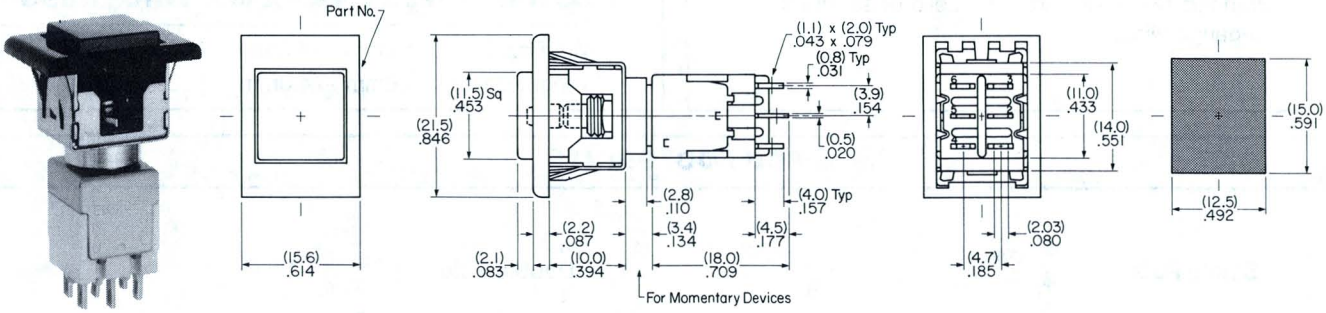
EB2061-J40A Model Shown

Solder Lug/Single Pole/With Bezel/High Rise



EB2011-J41B-A Model Shown

Solder Lug/Double Pole/With Bezel/High Rise



EB2061-J41B-A Model Shown

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SERIES SB & FB

SUBMINIATURE & SUPER-SUBMINIATURE PUSHBUTTON SWITCHES

NKK SERIES SB

SUBMINIATURE/3 AMP RATED/BUSHING MOUNT

DISTINCTIVE FEATURES

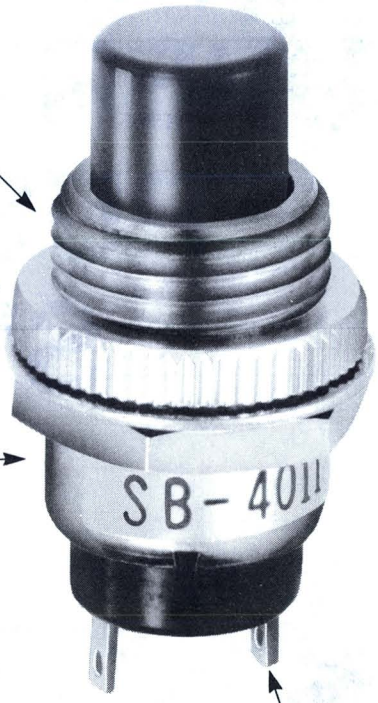
Optional slip-on caps in seven colors to vary appearance as needed.

Easy actuation due to low operating force.

Low cost device of rugged, one-piece bushing and housing construction.

Rear panel bushing mounting with compact behind panel dimension.

Internal antijamming feature to protect the contacts from damage due to excessive force on the plunger.



Reliability of construction with an internal guide to maintain contact alignment.

Actual Size

3 amp rating with silver contacts standard.

Epoxy sealed terminals with normally open circuits.

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NKK SERIES SB PUSHBUTTON SWITCHES

SUBMINIATURE/3 AMP RATED/BUSHING MOUNT

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	3A @ 125V AC or 2A @ 30V DC for silver 0.4VA maximum @ 28V AC/DC maximum for gold (Applicable Range 0.1mA ~ 0.1A @ 20mv ~ 28V)
Contact Resistance:	10 milliohms maximum for silver 20 milliohms maximum for gold
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts and between contacts and case
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through 158°F)

	SB4011NO	SB4011NC
Pretravel:	0.79mm (.031")	0.64mm (.025")
Overtravel:	1.45mm (.057")	1.60mm (.063)
Total Travel:	2.24mm (.088")	2.24mm (.088")

Nominal Operating Force: 500 grams

APPLICATIONS

Series SB subminiature pushbuttons offer a low cost option for users of switches in communication equipment, machinery, security devices, and other applications. The small behind panel dimension, availability of two plunger colors, momentary function with normally open or normally closed contacts, epoxy seal on normally open models, and an optional cap all give the customer selections to suit a variety of needs.

UL & CSA

The models recognized by Underwriters Laboratories Inc. under the File Number E44145 are those rated 3A @ 125V AC.

The models certified by Canadian Standards Association are those rated 3A @ 125V AC and 2A @ 250V AC. NKK's File Numbers at CSA are LR23535 and LR56017.

MATERIALS AND FINISHES

Plunger	Phenolic resin
Bushing/Housing	Brass with nickel plating
Movable Contactor	Copper with silver or gold plating
Stationary Contacts	Copper with silver or gold plating
Case	Phenolic resin
Terminals	Copper with silver plating

NKK SERIES SB PUSHBUTTON SWITCHES

SUBMINIATURE/3 AMP RATED/BUSHING MOUNT

TYPICAL SWITCH ORDERING EXAMPLE

SB40 | 11NC | M | — | | | — |

POLE & CIRCUIT			
11NO	SPST	OFF	(ON)
11NC	SPST	ON	(OFF)
( ) = Momentary			

PLUNGER COLOR	
No Code	Black
C	Red

CONTACT MATERIAL & RATING	
No Code	Silver 3A @ 125V AC or 2A @ 30V DC
G	Gold 0.4VA max. @ 28V max.

BUSHING	
M	Metric 12mm Dia. M12P1
H	Inch .472" Dia. 15/32-32NS

CAP/COLOR	
No Code	Without Cap
2A	Black
2B	White
2C	Red
2E	Yellow
2F	Green
2G	Blue
24	Bright Chrome

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (SB4011NCM):

SERIES SB PUSHBUTTON

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

Note: Contact factory for epoxy seal on normally closed models.

OPTIONAL SLIP-ON CAP & COLORS

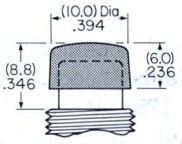
- **2A** Black
- **2B** White
- **2C** Red
- **2E** Yellow
- **2F** Green
- **2G** Blue
- **24** Bright Chrome

AT422 .394" Dia. Cap

Polyethylene for colored caps

ABS resin with chrome plating for bright chrome caps

(factory assembled only)



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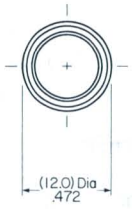
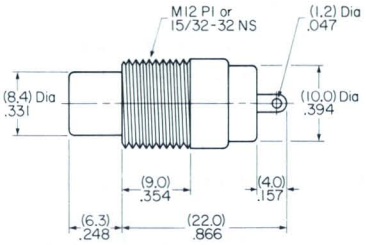
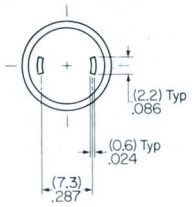
NKK SERIES SB PUSHBUTTON SWITCHES

SUBMINIATURE/3 AMP RATED/BUSHING MOUNT

SB4011NO/Solder Lug/Single Pole



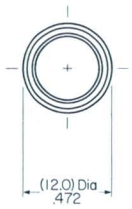


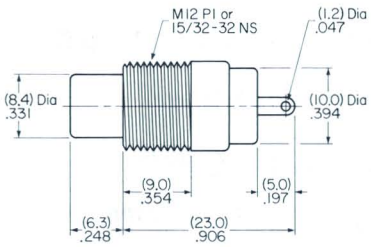


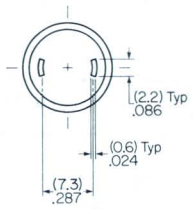
SB4011NOM Model Shown

Supplied with epoxy sealed terminals.

SB4011NC/Solder Lug/Single Pole







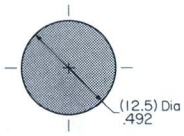
SB4011NCM Model Shown

PANEL THICKNESS & CUTOUT

Panel Thickness:

4mm (.157") maximum

Panel Cutout:



STANDARD HARDWARE

Hardware provided with each switch:

Metric	Inch
1 Knurled Face Nut AT504	2 Hex Mounting Nuts AT527H
1 Lockwasher AT508	1 Lockwasher AT508
1 Hex Mounting Nut AT527M	

Dimension drawings in hardware section at end of this catalog give further detail.

SOLDERING & WIRING

3 seconds at 350°C
5 seconds at 270°C

The .047" diameter hole in SB4011 accommodates one solid 18-gauge wire.

NKK SERIES FB PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/MOMENTARY/PANEL MOUNT

APPLICATIONS

NKK'S super-subminiature FB Series single pole switch features a 5mm (.197") diameter bushing and total switch length of less than 1 inch (.819"). These dimensions enhance the user's efficient use of space. The FB switch with its .100" terminal spacing and epoxy sealed terminals is also suitable for PC board mounting.

With ratings of 500mA @ 125V AC and 0.4VA @ 28V AC/DC, these momentary, normally open devices are designed for reliability and longevity. FB switches are guaranteed for a minimum of 50,000 electrical and 50,000 mechanical operations. The one-piece bushing and housing construction prevents separation during installation.

UL RECOGNITION

FB models rated at 500mA are recognized by Underwriters Laboratories Inc.

The UL File Number is E44145.

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	500mA @ 125V AC for silver contacts 0.4VA maximum @ 28V AC/DC maximum for gold contacts (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	30 milliohms maximum
Insulation Resistance:	100 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	50,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through 158°F)
Pretravel:	1.1mm (.043")
Overtravel:	0.57mm (.022")
Total Travel:	1.67mm (.065")
Operating Force:	220 grams average

MATERIALS AND FINISHES

Plunger	Polyacetal
Bushing/Housing	Brass with nickel plating
Movable Contact	Brass with silver or gold plating
Case	Phenolic resin
Stationary Terminals	Phosphor bronze with silver or gold plating

ACTUAL SIZE

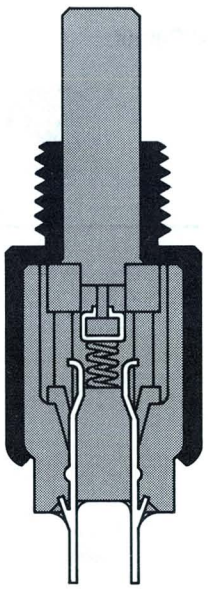
Total Length:
20.8mm
.819"

Behind Panel:
11.8mm
.465"

CONTACT MECHANISM

The FB switch is available in a single pole single throw, normally open (NO) circuit with momentary contact. The switch is designed so that the contact points are cleaned during every switching motion. This self-cleaning feature results in high contact reliability without compromising the switch's high mechanical stability.

The movable contactor slides between the flexible stationary contacts when the plunger is pressed. The one-piece terminal and stationary contact construction minimizes contact resistance and prevents premature failure.



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NKK SERIES FB PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/MOMENTARY/PANEL MOUNT

TYPICAL SWITCH ORDERING EXAMPLE

FB 15AN E P 2 — F A

POLE & CIRCUIT			
15AN	SPST	OFF	(ON)
( ) = Momentary			

CONTACT MATERIALS & RATINGS	
2	Silver Plating 500mA @ 125V AC
4	Gold Plating 0.4VA max. @ 28V AC/DC max.

SEAL	
E	Epoxy Sealed

TERMINALS	
P	Solder Lug/PC

IMPORTANT: Switches are supplied without UL marking unless specified. See Supplement for instructions.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (FB15ANEP2FA):

SERIES FB PUSHBUTTON

.201" Diameter Black Cap

Silver Plated Contacts with 500mA Rating

SPST OFF-(ON) Circuit

Epoxy Sealed Solder Lug/ PC Terminals

OPTIONAL CAPS	
F	.201" Diameter
H	.295" Diameter

CAP COLORS	
A	Black
B	White
C	Red

POLE AND CIRCUIT

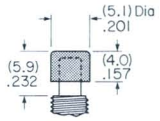
POLE & THROW	MODEL	PLUNGER POSITION ( ) = Momentary: Normal	Down
SPST	FB15AN	OFF	(ON)
SCHEMATIC			

Terminal numbers are not actually on the switch.

OPTIONAL SLIP-ON CAPS

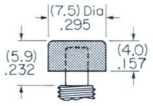
F **AT475 .201" Diameter**

Polycarbonate



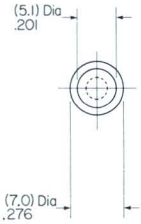
H **AT496 .295" Diameter**

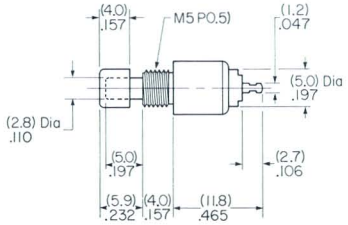
Polycarbonate

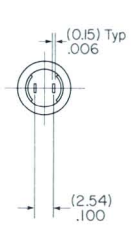


Colors Available:
A Black **B** White **C** Red

SOLDER LUG/SINGLE POLE



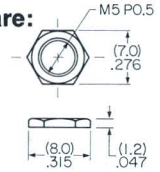




FB15ANEP2-FA Model Shown

MOUNTING

Standard Hardware:
AT536 Hex Nut
Brass with nickel plating



Panel Cutout:

Panel Thickness:
2.8mm (.110") maximum

Soldering Limits:
3 seconds at 350°C

NOTES

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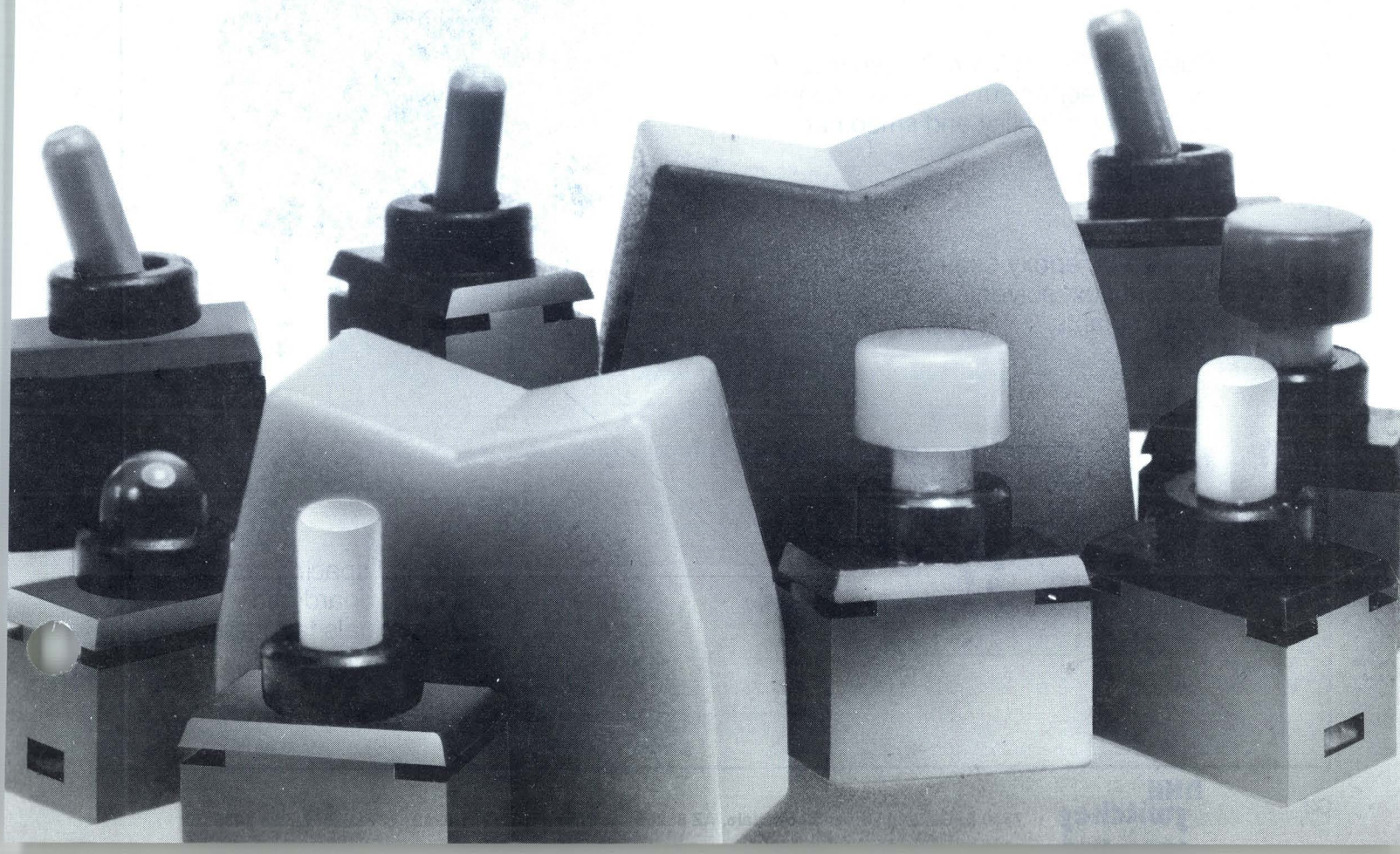
SERIES G

MICRO-SUBMINIATURE SWITCHES

- TOGGLES
- ROCKERS
- PUSHBUTTONS
- INDICATORS
- SURFACE MOUNT



NKK SERIES G

MICRO-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

DISTINCTIVE FEATURES

World's first to be approved by International Electrotechnical Commission's Quality Assessment System

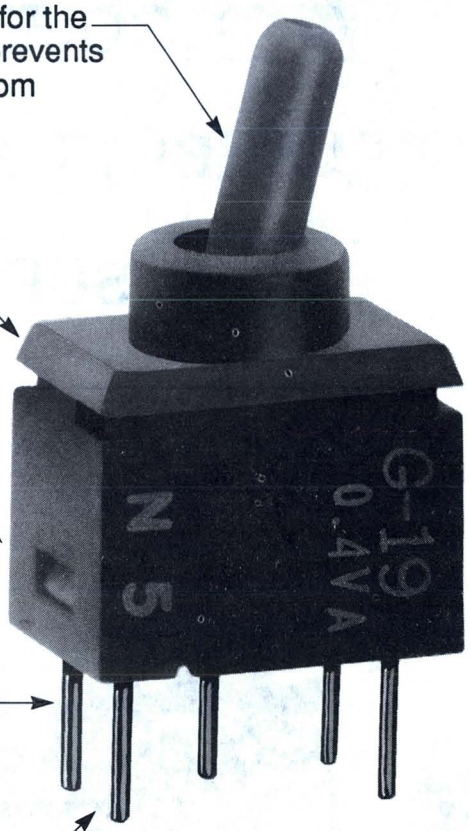
Micro-subminiature size (1/3 the volume of super-subminiatures) allows for high density mounting, and extremely light weight of 0.25 grams makes this device suited for use in handheld equipment.

The use of antistatic resin for the housing, base, and lever prevents static electricity charges from reaching the contacts.

Totally sealed body prevents contact contamination and allows time- and money-saving automated wave soldering and washing.

Patented Sliding Twin Crossbar (STC) contact mechanism provides unequalled logic-level reliability and smoother actuation.

Molded-in, epoxy sealed terminals lock out flux, solvents, and other contaminants.



Actual Size

.100" X .100" terminal spacing conforms to standard PC board grid spacing. Round terminals facilitate easier mounting on PC boards.

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NKK SERIES G SWITCHES

MICRO-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

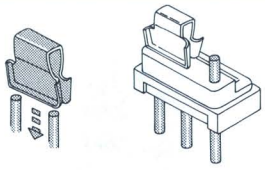
GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	80 milliohms maximum
Insulation Resistance:	500 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	100,000 operations minimum for ON-NONE-ON & ON-OFF-ON 50,000 operations minimum for other circuits
Electrical Life:	100,000 operations minimum for ON-NONE-ON & ON-OFF-ON 50,000 operations minimum for other circuits
Ambient Temp Range:	-25°C through +70°C (-13°F through +158°F)
Toggle Angle of Throw:	28°
Pushbutton Travel:	Pretravel 0.9mm (.035") Overtravel 0.2mm (.008") Total 1.1mm (.043")
Contact Bounce:	1 millisecond
Nominal Operating Force:	Toggles: 95g (momentary); 122g (maintained) Rockers: 83g (momentary); 108g (maintained) Pushbuttons: 200g
Soldering Limits:	3 seconds @ 350°C or 5 seconds @ 270°C

MATERIALS & FINISHES

Actuator	Glass fiber reinforced polyamide for toggles & rockers; polyacetal for pushbuttons
Case	Glass fiber reinforced polyamide
Sealing Rings	Nitrile butadiene rubber
Movable Contact	Phosphor bronze with gold plating over nickel
Stationary Contacts	Phosphor bronze with gold plating over nickel
Base	Glass fiber reinforced polyamide
Terminals	Phosphor bronze with gold plating over nickel

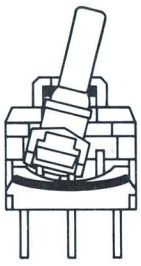
STC CONTACT MECHANISM



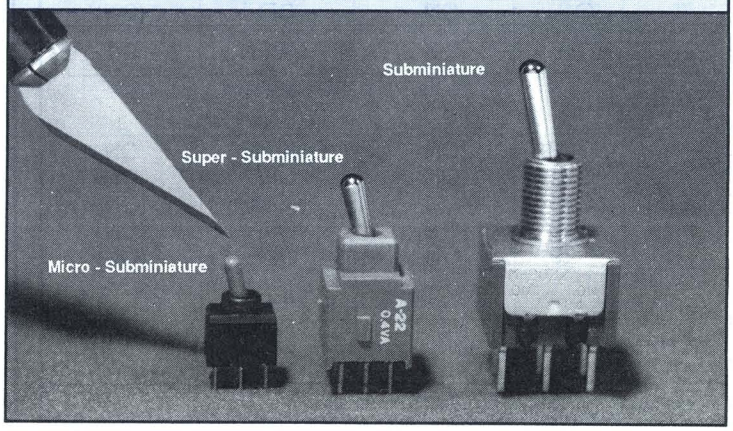
NKK's patented, award-winning Sliding Twin Crossbar (STC) contact mechanism offers benefits unavailable in conventional mechanisms. For example, movable twin contact surfaces pinch the stationary contacts to provide increased contact stability and unparalleled logic-level reliability. Continued reliability is assured since the gold-plated contacts are wiped clean with each actuation. Furthermore, if one side of the twin contacts should fail to conduct, the other side functions as a backup, or fail-safe path for the current. The combination of rounded movable and stationary contacts provides smooth contact feel previously unavailable in sliding contact type mechanisms.

WASHABILITY

A combination of design features makes the G Series switches totally sealed: 1) The bushing and housing are one molded piece. 2) Rubber rings surround the actuator and the base where it fits into the housing. 3) Terminals are molded into the base and epoxy sealed. These features allow time- and money-saving automated soldering techniques and safe washing with freon or alcohol base cleaning solvents.



RELATIVE SIZE COMPARISON



NKK SERIES G TOGGLES & ROCKERS

MICRO-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

G 1 2 A H — □ □

POLES

1	SPDT
2	DPDT

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
( ) = Momentary			

PC TERMINALS

Toggles		Rockers	
P	Straight	P	Straight
H	R. Angle	--	*Not*
V	Vertical	--	*Available*

ACTUATORS

A	.150" Column Toggle
K	Snap Top for Rocker

ROCKER CAP

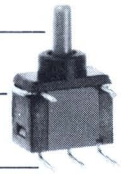
Y	Rocker

CAP COLORS

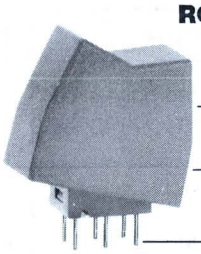
A	Black
B	White
C	Red

DESCRIPTION FOR TYPICAL TOGGLE ORDERING EXAMPLE (G12AH)

.150" Column Toggle
SPDT ON-NONE-ON Circuit
Right Angle PC Terminals



DESCRIPTION FOR TYPICAL ROCKER ORDERING EXAMPLE (G29KP-YA)



Snap Top w/Black Rocker
DPDT ON-OFF-(ON) Circuit
Straight PC Terminals

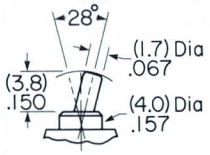
POLES AND CIRCUITS

POLE & THROW	MODEL	ACTUATOR POSITION & TERMINAL NUMBER (Momentary) Up	Center	Down
SPDT	G12	ON	NONE	ON
	G13	ON	OFF	ON
	G15	ON	NONE	(ON)
	G18	(ON)	OFF	(ON)
	G19	ON	OFF	(ON)
CONNECTED TERMINALS		2-3	OPEN	2-1
SCHEMATIC				
DPDT	G22	ON	NONE	ON
	G23	ON	OFF	ON
	G25	ON	NONE	(ON)
	G28	(ON)	OFF	(ON)
	G29	ON	OFF	(ON)
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4
SCHEMATIC				

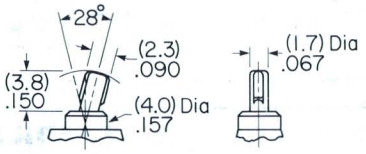
Terminal numbers are not actually on the switch.

ACTUATORS AND CAP

A .150" Column Toggle

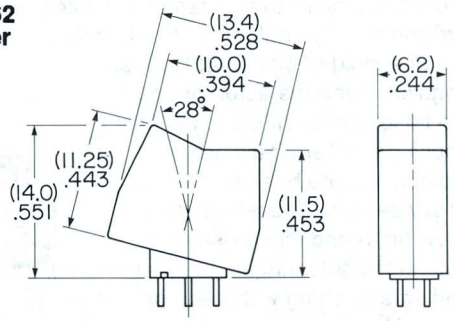


K Snap Top



Y AT4062 Rocker

Colors:
A Black
B White
C Red



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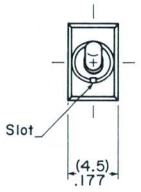
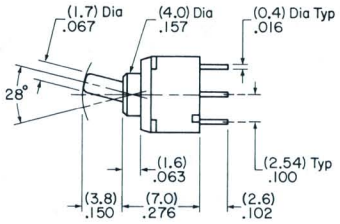
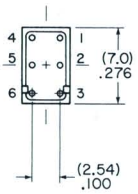
NKK SERIES G TOGGLES & ROCKERS

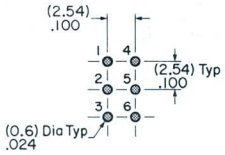
MICRO-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

P Straight PC Terminals/Single & Double Pole





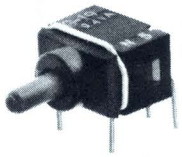


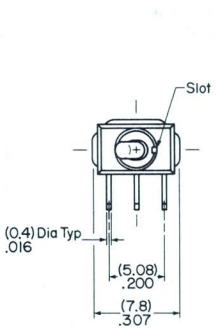


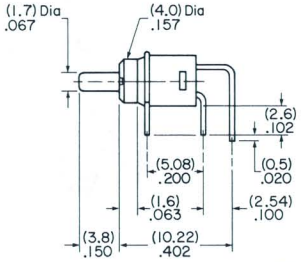
G19AP Model Shown

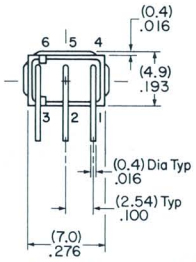
Single pole switches have terminals 1, 2 & 3 with support pins at positions 4 & 6.

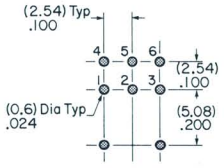
H Right Angle PC Terminals/Single & Double Pole







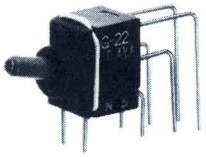


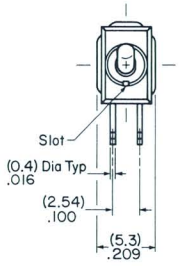


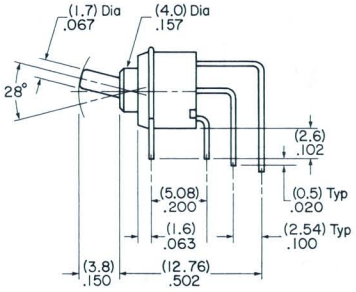
G19AH Model Shown

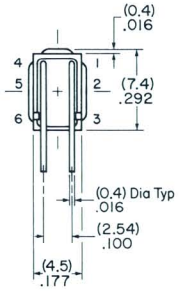
Single pole switches have terminals 1, 2 & 3 along with 2 support pins.

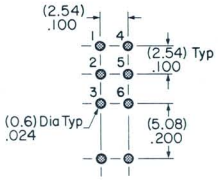
V Vertical PC Terminals/Single & Double Pole







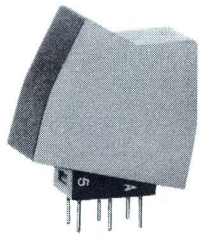


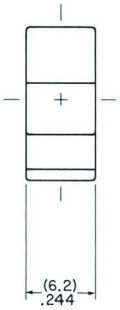


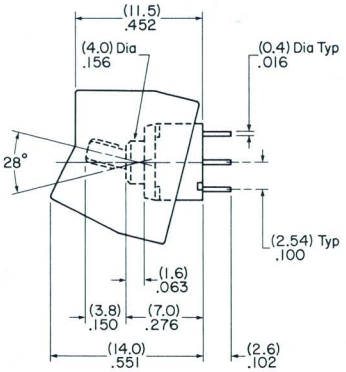
G22AV Model Shown

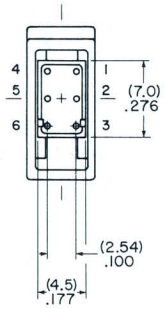
Single pole switches have terminals 1, 2 & 3 along with 2 support pins.

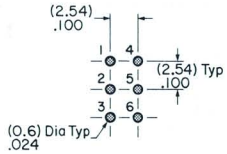
P Straight PC Terminals with Rocker/Single & Double Pole











G23KP-YA Model Shown

Single pole switches have terminals 1, 2 & 3 with support pins at positions 4 & 6.

NKK SERIES GB PUSHBUTTON SWITCHES

MICRO-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

GB 2 5 A V – X C

POLES

1	SPDT
2	DPDT

CIRCUITS

5	ON	(ON)
( ) = Momentary		

PLUNGER

A	.130" Long

PC TERMINALS

P	Straight
H	Right Angle
V	Vertical

SLIP-ON CAP

X	.157" Diameter

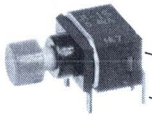
COLORS

A	Black
B	White
C	Red

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (GB15AH-XC)

SERIES GB PUSHBUTTON

Snap Top Plunger w/Red .157" Diameter Cap



DPDT ON-(ON) Circuit

Right Angle PC Terminals

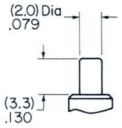
POLES AND CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS (Momentary) Normal	Down
SPDT	GB15	ON	(ON)
CONNECTED TERMINALS		2-3	2-1
SCHEMATIC			
DPDT	GB25	ON	(ON)
CONNECTED TERMINALS		2-3 5-6	2-1 5-4
SCHEMATIC			

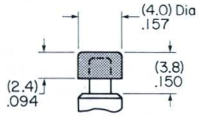
Terminal numbers are not actually on the switch.

PLUNGER AND CAP

A .130" Long Plunger



X AT4063 .157" Dia. Slip-on Cap

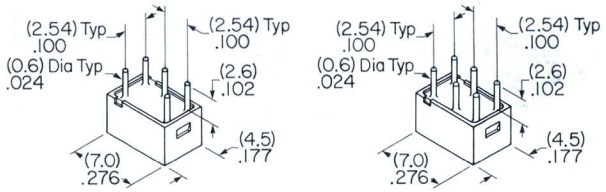


Cap Colors: **A** Black **B** White **C** Red

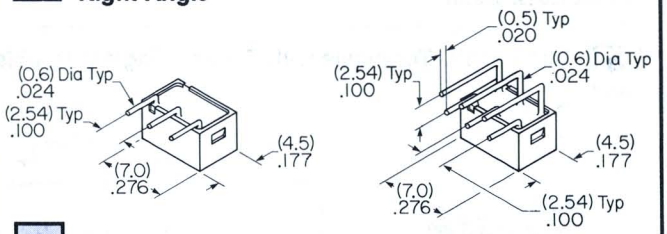
Cap Material: Polyamide

PC TERMINALS

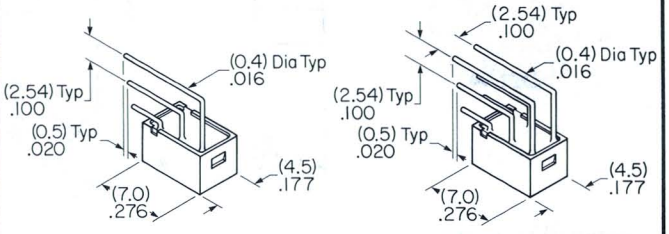
P Straight



H Right Angle



V Vertical



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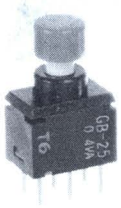
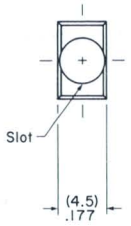
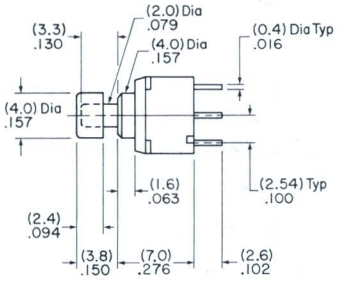
SERIES GB PUSHBUTTON SWITCHES

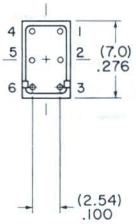
MICRO-SUBMINIATURE/PCB/ANTISTATIC/WASHABLE

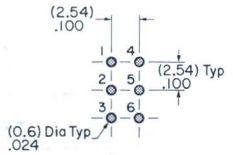
P Straight PC Terminals/Single & Double Pole







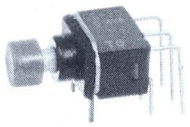


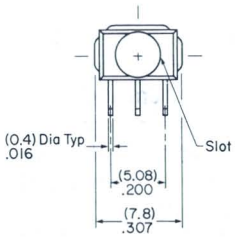


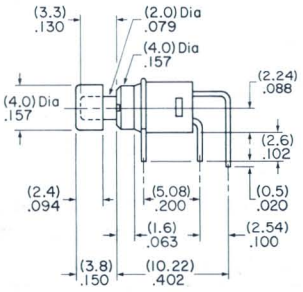
GB25AP-XC Model Shown

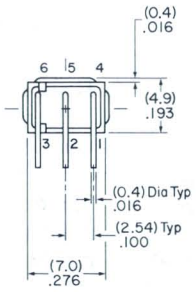
Single pole switches have terminals 1, 2 & 3 with support pins at positions 4 & 6.

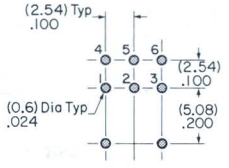
H Right Angle PC Terminals/Single & Double Pole







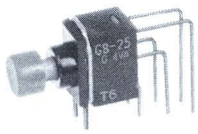


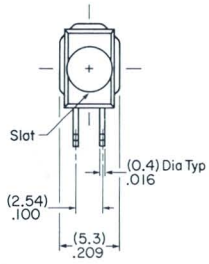


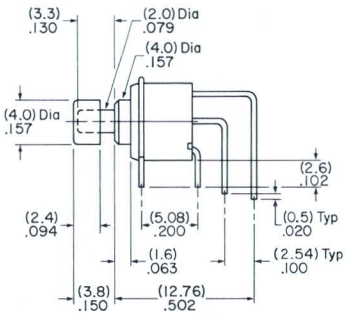
GB25AH-XC Model Shown

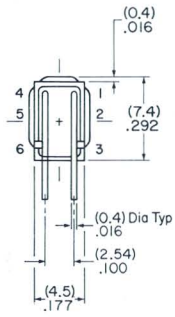
Single pole switches have terminals 1, 2 & 3 along with 2 support pins.

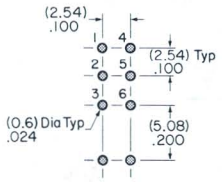
V Vertical PC Terminals/Single & Double Pole











GB25AV-XC Model Shown

Single pole switches have terminals 1, 2 & 3 along with 2 support pins.

NKK SERIES G INDICATORS

MICRO-SUBMINIATURE/PCB

TYPICAL INDICATOR ORDERING EXAMPLE

G01 – P C

PC TERMINALS	
P	Straight
V	Vertical

COLORS	
C	Red
E	Yellow
F	Green

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (G01PC)

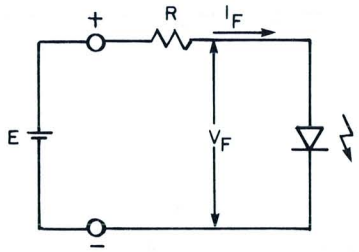
SERIES G INDICATOR

Red LED

Straight PC Terminals

Actual Size

ELECTRICAL SPECIFICATIONS FOR SINGLE ELEMENT LED



$$R = \frac{E - V_F}{I_F}$$

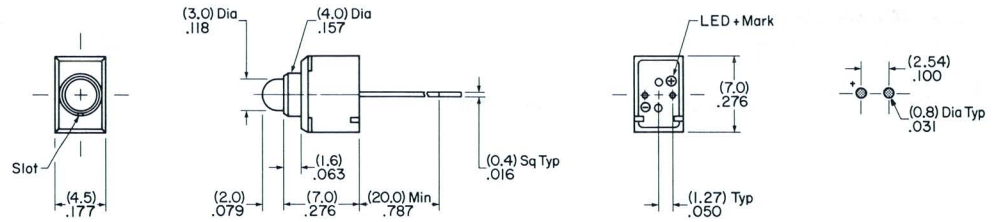
Where: R = Resistor Value (Ohms)
E = Source Voltage (V)
V_F = Forward Voltage (V)
I_F = Forward Current (mA)

		Red	Yellow	Green
Forward Peak Current	I_{FM}	30mA	20mA	30mA
Continuous Forward Current	I_F	24mA	16mA	24mA
Forward Voltage	V_F	1.96V	1.95V	2.01V
Reverse Peak Voltage	V_{RM}	5V	5V	5V
Current Reduction Rate Above 25°C	ΔI_F	0.40mA/°C	0.27mA/°C	0.40mA/°C

The electrical specifications shown above are determined at a basic temperature of 25°C. If the source voltage exceeds the LED's rated voltage, the required ballast resistor value can be calculated by using the accompanying formula.

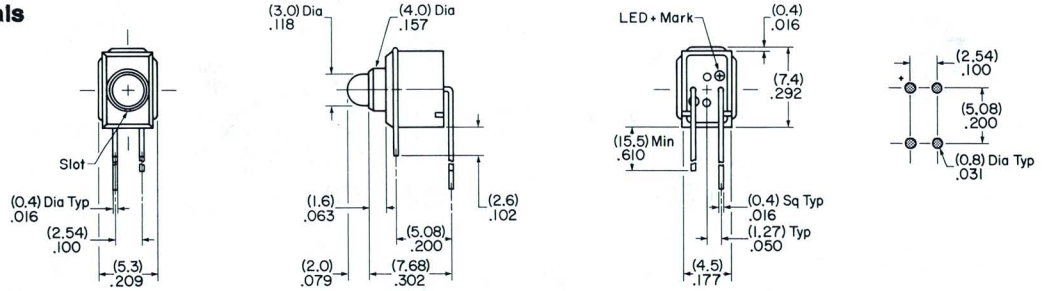
P Straight PC Terminals

G01PC
Model Shown



V Vertical PC Terminals

G01VC
Model Shown



These indicators have anode and cathode terminals along with 2 support pins.

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NKK SERIES G3

MICRO-SUBMINIATURE/SURFACE MOUNT/WASHABLE

DISTINCTIVE FEATURES

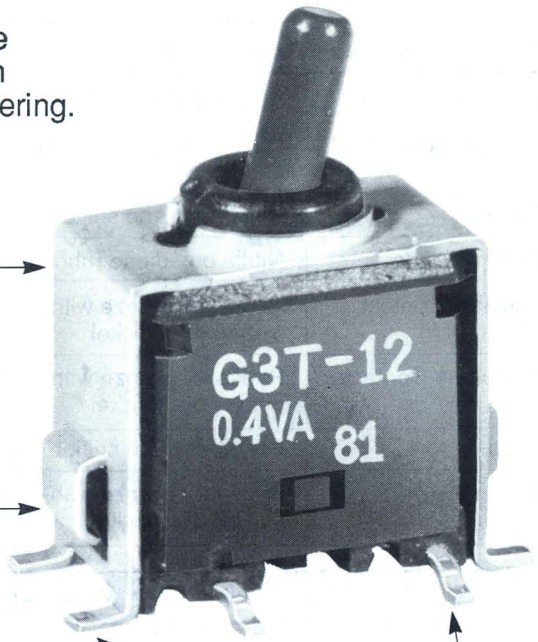
NEW Surface Mount Switches SMD

Micro-subminiature size (1/3 the volume of super-subminiatures) allows for high density mounting, and light weight of 0.65 grams makes these switches ideal for hand-held equipment.

Tape-reel and stick-tube packaging allow rapid automated placement of devices.

The use of heat resistant resin for the housing, base, and lever allows both vapor phase and infrared reflow soldering.

Totally sealed body prevents contact contamination and allows time- and money-saving automated soldering and washing.



Patented Sliding Twin Crossbar (STC) contact mechanism provides unequalled logic-level reliability and smoother actuation.

Actual Size

Designed with gull-wing terminals to satisfy the need for mechanical stability during soldering and to provide simplified solder joint inspection.

Molded-in, epoxy sealed terminals lock out flux, solvents, and other contaminants.

NKK SERIES G3 TOGGLE SWITCHES

MICRO-SUBMINIATURE/SURFACE MOUNT/WASHABLE

GENERAL SPECIFICATIONS

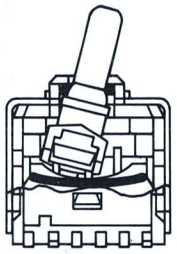
Electrical Capacity: (Resistive Load)	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	80 milliohms maximum
Insulation Resistance:	500 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	50,000 operations minimum
Ambient Temp Range:	-25°C through +70°C (-13°F through +158°F)
Angle of Throw & Travel:	28° for toggle; 1.1mm (.043") total travel for pushbutton
Nominal Operating Force:	Toggles: 95grams (momentary); 122grams (maintained) Pushbuttons: 183 grams

MATERIALS & FINISHES

Actuator	Polyphenylene sulfide
Support Bracket	Phosphor bronze with tin-lead plating
Case	Polyphenylene sulfide (94-V0)
Sealing Rings	Nitrile butadiene rubber
Movable Contact	Phosphor bronze with gold plating over nickel
Stationary Contacts	Phosphor bronze with gold plating over nickel
Base	Polyphenylene sulfide (94-V0)
Terminals	Phosphor bronze with gold plating over nickel

WASHABILITY

The G3 Series switches are totally sealed, having a combination of design features which define their washability:
1) A rubber ring surrounds the actuator.
2) A rubber seal surrounds the base where it fits into the housing.
3) Epoxy is used at the joining of the case and base. 4) Terminals are molded into the base and epoxy sealed. These features allow time- and money-saving automated processing techniques used with today's surface mount technology, including flux cleaning procedures.



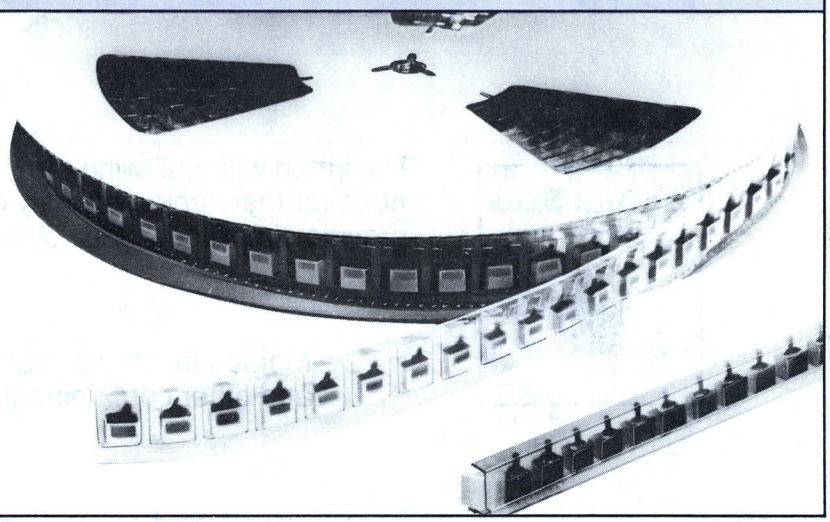
TAPE-REEL OR STICK-TUBE PACKAGING

G3 devices are packaged with 50 devices per stick-tube. The tube length for P type mounting models is 450mm and for B type mounting models is 525mm.

The right angle mounting devices are packaged only in a tape-reel 24mm wide with 500 devices per reel. The reel diameter is 330mm.

Both the tape-reel and stick-tube dimensions meet EIA standard 481A requirements.

Antistatic packaging material is available upon request.



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NKK SERIES G3 TOGGLE SWITCHES

MICRO-SUBMINIATURE/SURFACE MOUNT/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

G3T | 2 | 9 | A | H

POLES

1	SPDT
2	DPDT

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
( ) = Momentary			

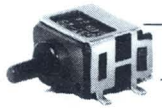
ACTUATORS

A	.150" Column Toggle

MOUNTING

P	Upright
B	Upright w/Bracket
H	Right Angle

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (G3T29AH)



.150" Column Toggle

DPDT ON-OFF-(ON) Circuit

Surface Mount Right Angle Terminals

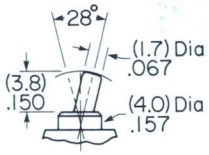
POLES AND CIRCUITS

POLE & THROW	MODEL	TOGGLE POSITION & TERMINAL NUMBERS ( ) = Momentary: Up	Center	Down
SPDT	G3T12	ON	NONE	ON
	G3T13	ON	OFF	ON
	G3T15	ON	NONE	(ON)
	G3T18	(ON)	OFF	(ON)
	G3T19	ON	OFF	(ON)
CONNECTED TERMINALS		2-3	OPEN	2-1
SCHEMATIC				
DPDT	G3T22	ON	NONE	ON
	G3T23	ON	OFF	ON
	G3T25	ON	NONE	(ON)
	G3T28	(ON)	OFF	(ON)
	G3T29	ON	OFF	(ON)
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4
SCHEMATIC				

Terminal numbers are not actually on the switch.

ACTUATOR

A .150" Column Toggle



MOUNTING AND SOLDERING

Vapor Phase Reflow Soldering Time & Temperature Limits
60 seconds @ 150°C + 60 seconds @ 215°C
(120 seconds total)
Switches should be left in unheated state at least 10 minutes after soldering before they are washed.

Infrared Reflow Soldering Time & Temp Limits
Preheat for 60 seconds @ 150°C (heat rise 1 - 5°C/second)
Soldering for 10 seconds @ 220°C

Manual Soldering Time & Temperature Limits
3 seconds @ 350°C or 10 seconds @ 260°C
Eutectic solder is recommended.

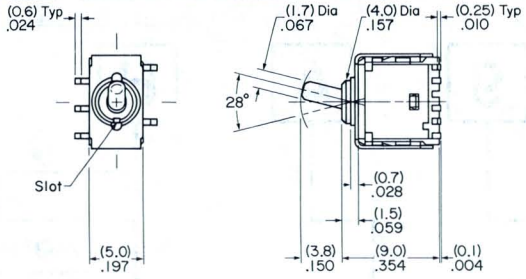
Mounting Note
It is recommended that the body of models for upright mounting without bracket be fastened to a panel or similar support for protection of solder joints from mechanical stress.

NKK SERIES G3 TOGGLE SWITCHES

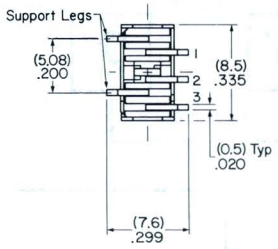
MICRO-SUBMINIATURE/SURFACE MOUNT/WASHABLE

P Upright Mounting/Single & Double Pole

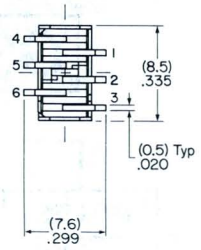
G3T12AP Model Shown



Single Pole

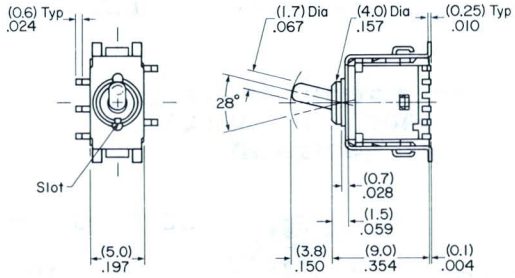


Double Pole

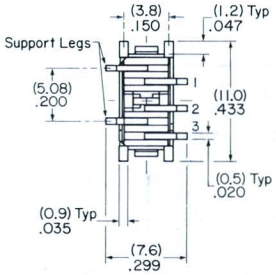


B Upright Mounting with Bracket/Single & Double Pole

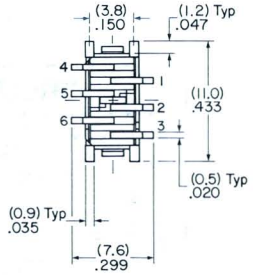
G3T22AB Model Shown



Single Pole

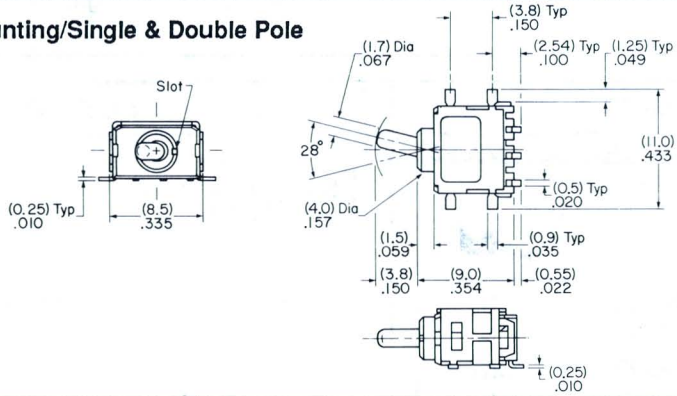


Double Pole

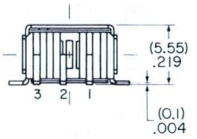


H Right Angle Mounting/Single & Double Pole

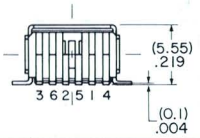
G3T12AH Model Shown



Single Pole



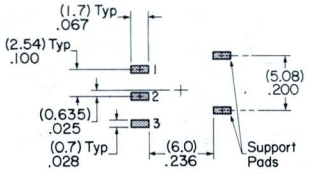
Double Pole



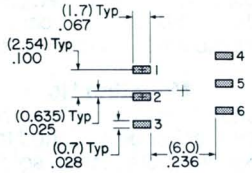
Pad Layouts for Surface Mount Terminals

Upright Mounting

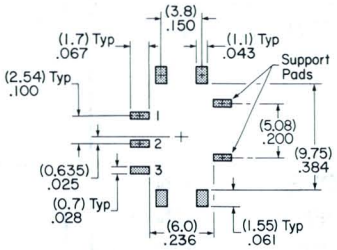
Single Pole Double Throw

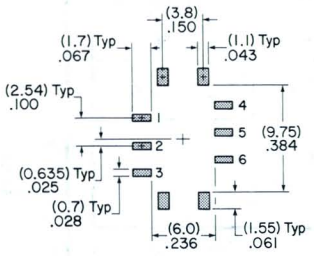


Double Pole Double Throw

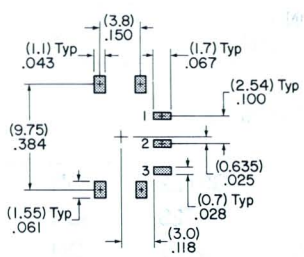


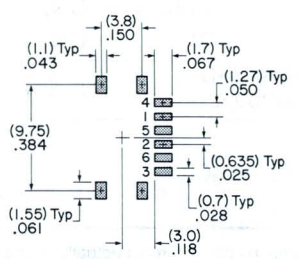
Upright Mounting w/Bracket





Right Angle Mounting





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NKK SERIES G3 PUSHBUTTON SWITCHES

MICRO-SUBMINIATURE/SURFACE MOUNT/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

G3B 1 5 A B — X A

POLES	
1	SPDT
2	DPDT

CIRCUITS		
5	ON	(ON)
( ) = Momentary		

PLUNGER	
A	.130" Long

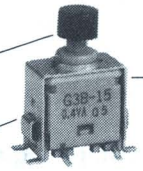
SLIP-ON CAP	
X	.157" Diameter

MOUNTING	
P	Upright
B	Upright w/Bracket
H	Right Angle

COLORS	
A	Black
B	White
C	Red

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (G3B15AB-XA)

.130" Plunger with Black
.157" Dia. Cap
SPDT ON-(ON) Circuit



Surface Mount
Upright
with Bracket

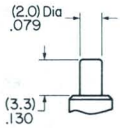
POLES AND CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary: Normal	Down
SPDT	G3B15	ON	(ON)
CONNECTED TERMINALS		2-3	2-1
SCHEMATIC			
DPDT	G3B25	ON	(ON)
CONNECTED TERMINALS		2-3 5-6	2-1 5-4
SCHEMATIC			

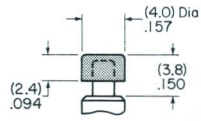
Terminal numbers are not actually on the switch.

PLUNGER & SLIP-ON CAP

A .130" Long



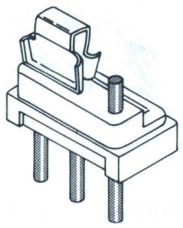
X AT4063 .157" Diameter



Cap Colors: **A** Black **B** White **C** Red Material: Polyamide Note: Install cap after soldering & washing.

STC CONTACT MECHANISM

The design of NKK's patented, award-winning Sliding Twin Crossbar (STC) contact mechanism diminishes contact bounce to give unparalleled logic-level reliability.



MOUNTING AND SOLDERING

Vapor Phase Reflow Soldering Time & Temperature Limits
60 seconds @ 150°C + 60 seconds @ 215°C
(120 seconds total)
Switches should be left in unheated state at least 10 minutes after soldering before they are washed.

Infrared Reflow Soldering Time & Temp Limits
Preheat for 60 seconds @ 150°C (heat rise 1 - 5°C/second)
Soldering for 10 seconds @ 220°C

Manual Soldering Time & Temperature Limits
3 seconds @ 350°C or 10 seconds @ 260°C
Eutectic solder is recommended.

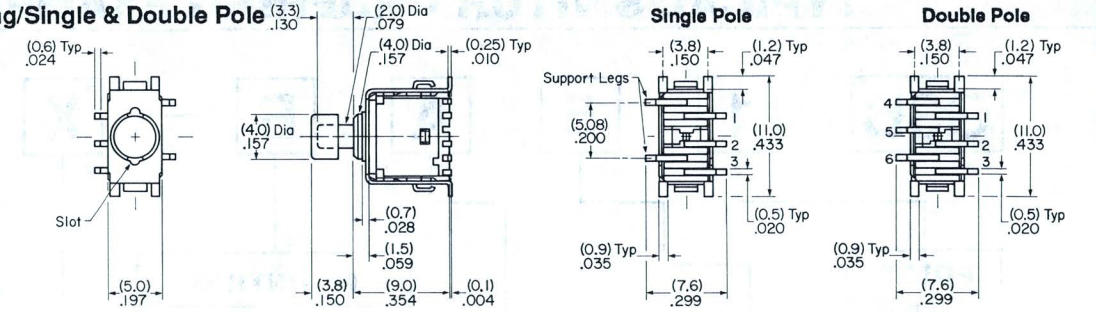
Mounting Note
It is recommended that the body of models for upright mounting without bracket be fastened to a panel or similar support for protection of solder joints from mechanical stress.

NKK SERIES G3 PUSHBUTTON SWITCHES

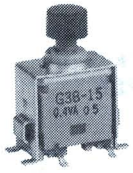
MICRO-SUBMINIATURE/SURFACE MOUNT/WASHABLE

P Upright Mounting/Single & Double Pole

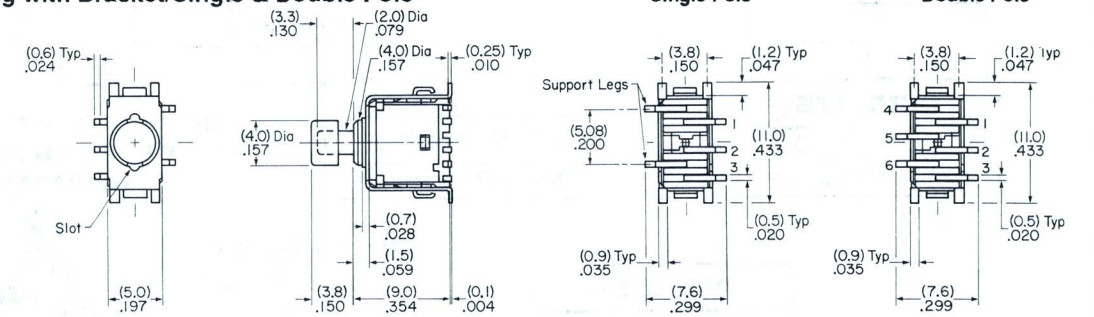
G3B25AP-XC Model Shown



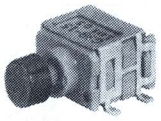
B Upright Mounting with Bracket/Single & Double Pole



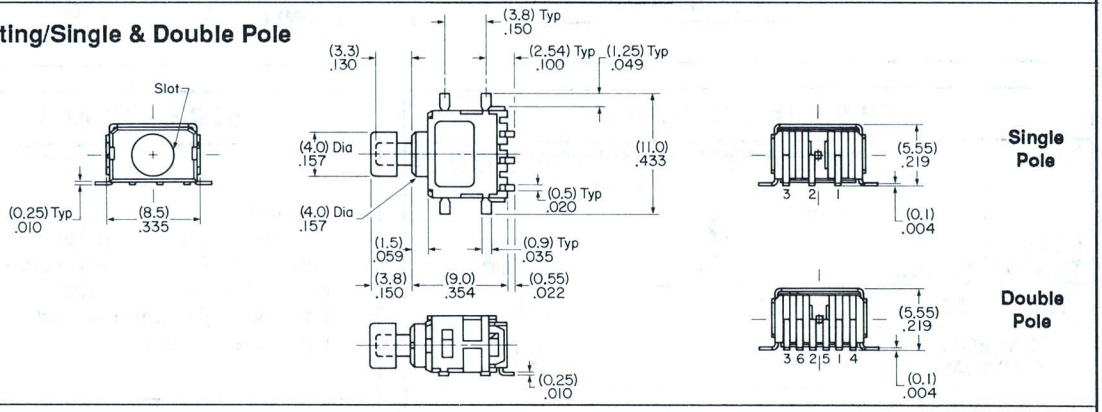
G3B15AB-XC Model Shown



H Horizontal Mounting/Single & Double Pole



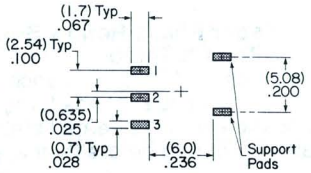
G3B15AH-XC Model Shown



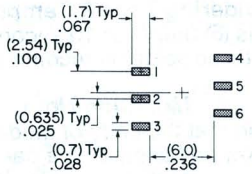
Pad Layouts for Surface Mount Terminals

Upright Mounting

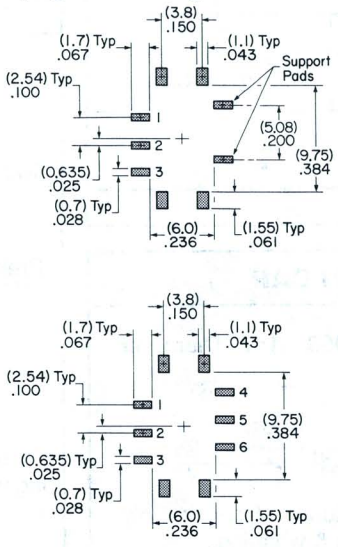
Single Pole Double Throw



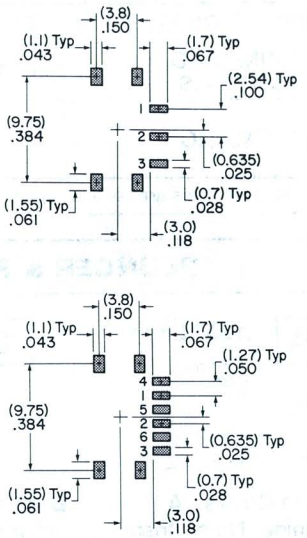
Double Pole Double Throw



Upright Mounting w/Bracket



Right Angle Mounting



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SERIES JB & JF

LOW PROFILE WASHABLE KEYPAD SWITCHES

NKK SERIES JB

DOME CONTACT/LOW PROFILE/WASHABLE

DISTINCTIVE FEATURES

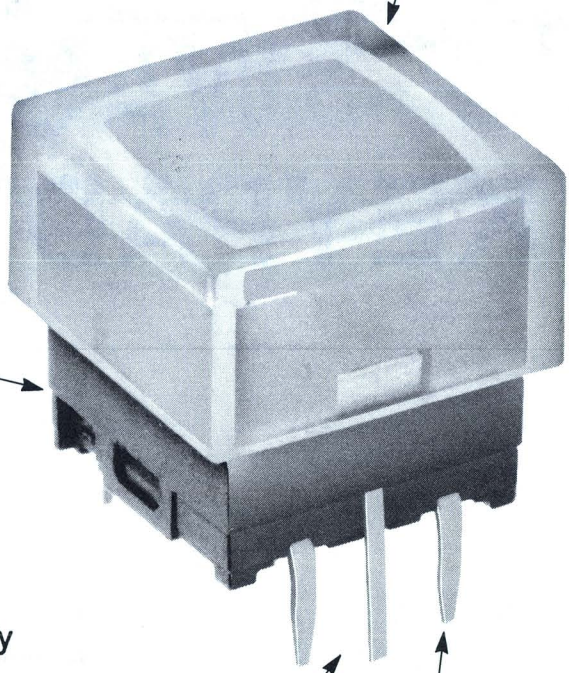
Low profile dimension from PCB to top of cap.

Bright, full surface illumination with red, green, or yellow LEDs.

270 gram operating force and short stroke of .300mm (.012") permit light touch operation.

Dome contact gives crisp tactile feedback to positively indicate circuit transfer and assures high reliability and long life of 1,000,000 operations.

Space saving body dimensions, 12.0mm (.472") square, provide for compact, side-by-side mounting on a standard grid.



Single-pole, single-throw contacts with strapped terminals allow X-Y coding on a single-sided PC board and simplify external circuit arrangement.

Actual Size

Terminal spacing conforms to standard .100" PCB grid.

Slanted terminals provide a spring type action which ensures secure mounting and prevents dislodging during wave soldering.

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NKK SERIES JB KEYPAD SWITCHES

DOME CONTACT/LOW PROFILE/WASHABLE

GENERAL SPECIFICATIONS

	Short Actuator	Extended Actuator
Electrical Capacity: (Resistive Load)	50mA @ 24V DC maximum	125mA @ 24V DC maximum
Contact Resistance:	50 milliohms maximum	50 milliohms maximum
Insulation Resistance:	500 megohms minimum @ 250V DC	500 megohms minimum @ 250V DC
Dielectric Strength:	250V AC minimum	250V AC minimum
Mechanical Life:	5,000,000 operations minimum	1,000,000 operations minimum
Electrical Life:	5,000,000 operations minimum	1,000,000 operations minimum
Total Travel:	.254mm (.010")	.300mm (.012")
Ambient Temp Range:	-25°C through +70°C (-13°F ~ +158°F)	-25°C through +70°C (-13°F ~ +158°F)
Nominal Operating Force:	180 grams	270 grams
Contact Bounce:	0.1 millisecond maximum	0.1 millisecond maximum

Keypads

MATERIALS & FINISHES

Plunger	Polyacetal
Case	Glass fiber reinforced polyamide
Seal	Nitrile butadiene rubber
Base	Glass fiber reinforced poly-butylene terephthalate
Movable Contact	Beryllium copper with silver plating
Stationary Contacts	Brass with silver plating
Terminals	Brass with silver plating

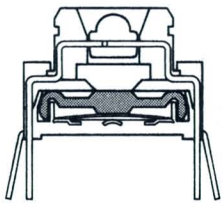
APPLICATIONS

These single pole single throw, momentary devices offer bright illumination with red, yellow or green LEDs.

Being single keys, these tact switches offer customers flexibility of key arrangement and pitch when placed in sets to meet specific panel design requirements. JB switches are ideal for numerous data input and control applications existing in today's products; such as, office automation equipment - copy machines, facsimiles and calculators, consumer electronics - VCRs, microwaves, televisions and remote controls; as well as, for cash registers and industrial equipment control panels.

DOME CONTACT

Spring action of the dome shaped movable contact gives the distinctive tactile feedback for which tact switches are known. This mechanical operation along with the use of copper alloy material assures a highly reliable device and provides long life, short stroke, plus light touch.



LEGENDS

Several methods of placing legends on the face of caps are available. The preferred method is pad printing due to its increased legend life. Hot stamping and engraving are also available. Details regarding these methods may be obtained from the factory.

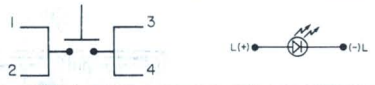
NKK SERIES JB KEYPAD SWITCHES

DOME CONTACT/LOW PROFILE/WASHABLE

POLE AND CIRCUIT

POLE & THROW	MODEL	ACTUATOR POSITION & TERMINAL NUMBERS ( ) = Momentary: Normal	Down
SPST	JB15	OFF	(ON)
	JB15H	OFF	(ON)

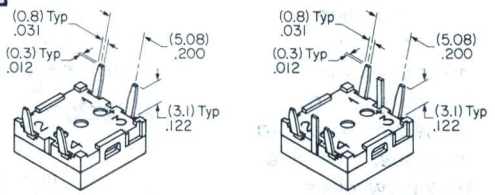
SCHEMATICS



Terminal numbers are actually on swtich. LED circuit is isolated & requires external switch.

TERMINALS

P Straight PC Terminals



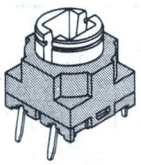
Nonilluminated **Illuminated**

Further dimensions appear at the end of this section.
Soldering time & temp: 3 sec. @ 350°C/5 sec. @ 270°C.

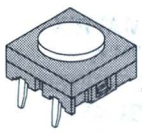
ACTUATOR TYPES

Nonilluminated

A Extended Actuator
Polyacetal

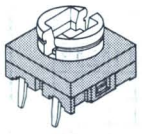


F Flat Blue Button
Polyacetal



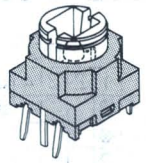
Flat button, an integral part of the switch, cannot be ordered separately.

K Short Actuator
Polyacetal



Illuminated

B Extended Actuator
Polyacetal



LED is an integral part of the switch and cannot be ordered separately.

L Short Actuator
Polyacetal

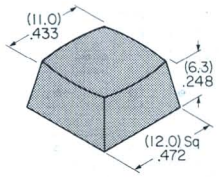
LED is an integral part of the switch and cannot be ordered separately.

SNAP-ON CAPS

Nonilluminated

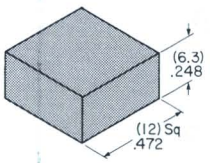
1 AT4058 Sculptured
Polyamide

Colors: A B C E F G H



2 AT4059 Flat
Polycarbonate

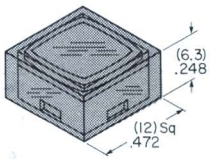
Colors: A B C E F G H



Illuminated

3 AT4060 Flat
Polycarbonate

LED Colors:
C E F
Diffuser Colors:
B C E F



Clear cover with white or colored translucent diffuser in a white frame.

Colors Codes: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

LED SPECIFICATIONS

LEDs are supplied as an integral part of illuminated devices and are not available separately. LED polarity markings are on the bottom of the switch. The electrical specifications shown are determined at a basic temperature of 25°C. If the source voltage exceeds the rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula in the Supplement at the end of this catalog.

		Red	Yellow	Green
Forward Peak Current	I_{FM}	30mA	20mA	20mA
Continuous Forward Current	I_F	20mA	15mA	15mA
Forward Voltage	V_F	2.0V	1.9V	1.95V
Reverse Peak Voltage	V_{RM}	5V	5V	5V
Current Reduction Rate Above 25°C	ΔI_F	0.40mA/°C	0.27mA/°C	0.27mA/°C

Keypads

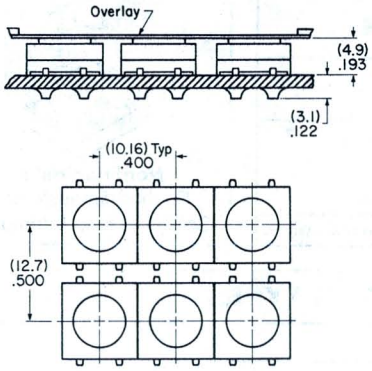
NKK SERIES JB KEYPAD SWITCHES

DOME CONTACT/LOW PROFILE/WASHABLE

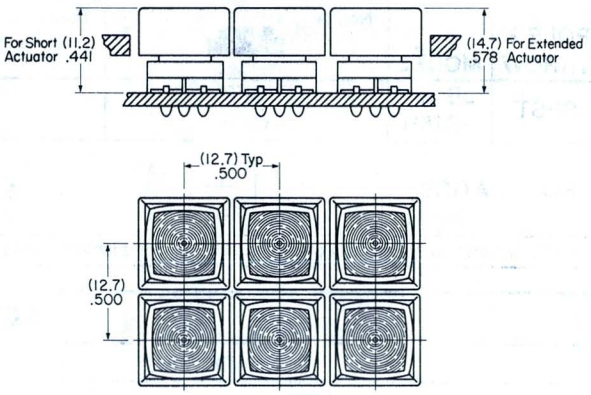
SIDE-BY-SIDE MOUNTING

Customers may custom design a keyboard to meet their specific needs by using these single keypad switches. Flat blue button switches may be mounted beneath an overlay. Switches with sculptured or flat caps may be mounted in a panel cutout.

With Flat Blue Buttons



With Snap-on Caps



DECODING SCHEMES & SCHEMATICS

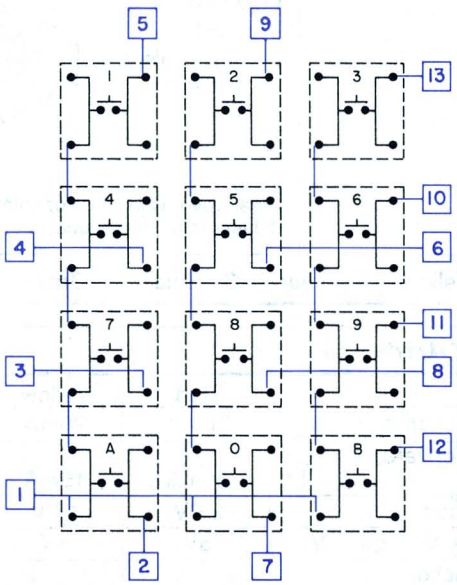
COMMON BUS MATRIX ON A SINGLE-SIDED PC BOARD

On the schematic, blue indicates PC board trace and black represents switch and its internal circuit.

PC Terminations

Keys	1	2	3	4	5	6	7	8	9	10	11	12	13
1	●				●								
2	●								●				
3	●												●
4	●			●									
5	●					●							
6	●									●			
7	●		●										
8	●								●				
9	●										●		
0	●							●					
A	●	●											
B	●											●	

● = ON



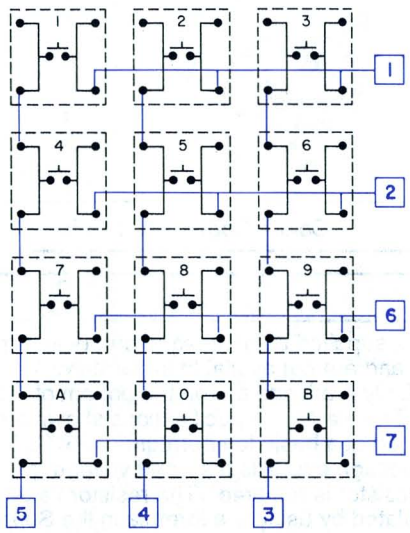
X-Y MATRIX ON A SINGLE-SIDED PC BOARD

On the schematic, blue indicates PC board trace and black represents switch and its internal circuit.

PC Terminations

Keys	1	2	3	4	5	6	7
1	●				●		
2	●			●			
3	●		●				
4		●			●		
5		●		●			
6		●	●				
7					●	●	
8				●		●	
9			●			●	
0				●			●
A					●		●
B			●				●

● = ON



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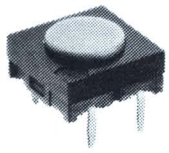
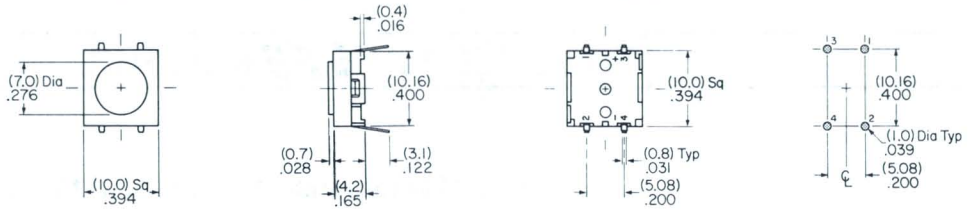
NKK SERIES JB KEYPAD SWITCHES

DOME CONTACT/LOW PROFILE/WASHABLE

Nonilluminated/with Flat Blue Button

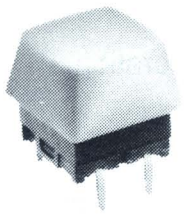


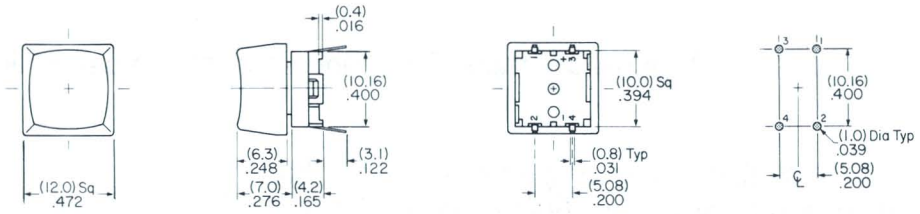


JB15FP Model Shown

Spring action terminals conform to .100" PCB spacing.

Nonilluminated/with Sculptured Snap-on Cap

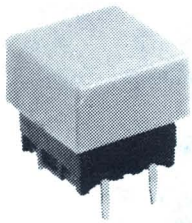


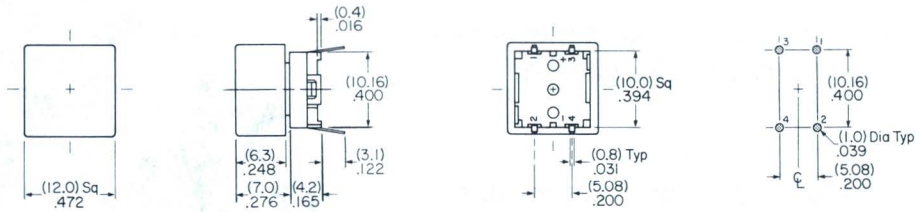


JB15KP-1C Model Shown

Spring action terminals conform to .100" PCB spacing.

Nonilluminated/with Flat Snap-on Cap

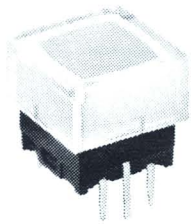


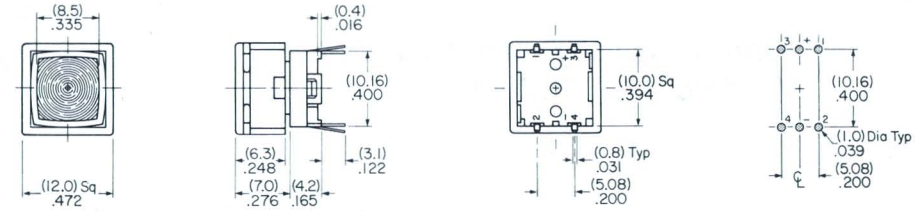


JB15KP-2C Model Shown

Spring action terminals conform to .100" PCB spacing.

Illuminated/with Flat Snap-on Cap

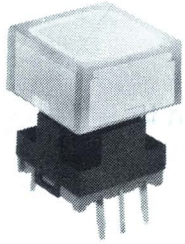


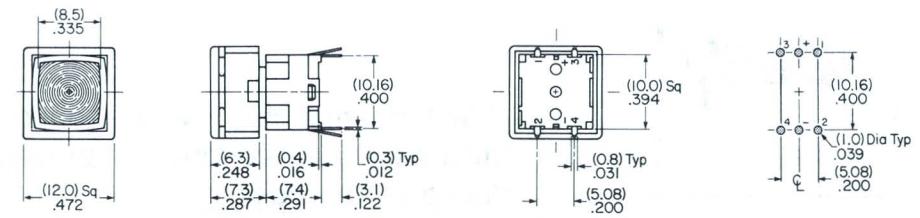


JB15LP-3CC Model Shown

Spring action terminals conform to .100" PCB spacing.

Illuminated/with Flat Snap-on Cap





JB15HBP-3CC Model Shown

Spring action terminals conform to .100" PCB spacing. Nonilluminated models do not have lamp terminals.

Keypads

NKK SERIES JF

DOME CONTACT/LOW PROFILE/WASHABLE

DISTINCTIVE FEATURES

Low profile dimensions from PCB to top of switch.

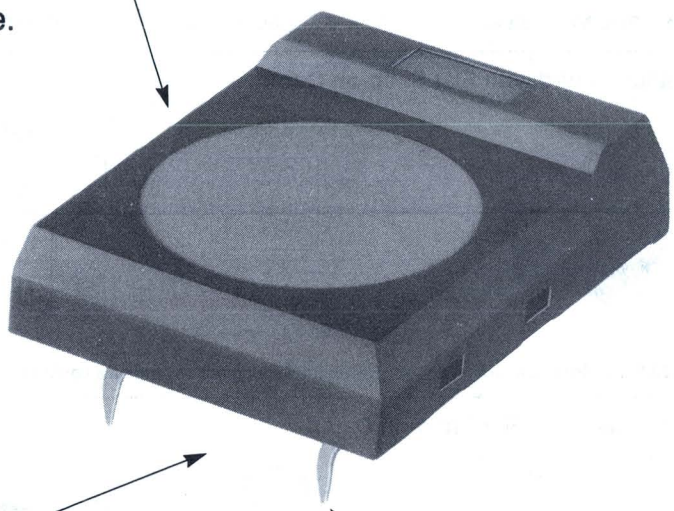
Wide choice of body shapes and colors.

Minimal operating force and short stroke permit light touch operation.

Dome contact gives crisp tactile and audible feedback to positively indicate circuit transfer and assures high reliability and long life.

Totally sealed contact mechanism permits wave soldering and washing.

Space saving body dimensions provide for compact, side-by-side mounting on a standard grid.

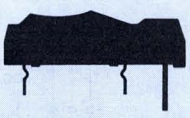


Terminal spacing conforms to standard .100" PCB grid.

Single-pole, single-throw contacts with strapped terminals allow X-Y coding on a single-sided PC board and simplify external circuit arrangement.

Crimped terminals provide a spring type action to ensure secure mounting and prevent dislodging during wave soldering.

Actual Size



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NKK SERIES JF KEYPAD SWITCHES

DOME CONTACT/LOW PROFILE/WASHABLE

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	50mA @ 24V DC
Contact Resistance:	50 milliohms maximum
Insulation Resistance:	500 megohms minimum @ 250V DC
Dielectric Strength:	250V AC minimum
Mechanical Life:	500,000 operations minimum
Electrical Life:	500,000 operations minimum
Total Travel:	0.4mm (.016") for flush actuator & 0.8mm (.031") for sculptured actuator
Ambient Temp Range:	-25°C through +70°C (-13°F through +158°F) for illuminated models -25°C through +85°C (-13°F through +185°F) for nonilluminated models
Nominal Operating Force:	200 grams with sculptured actuator; 350 grams with flush actuator
Contact Bounce:	0.1 millisecond maximum

MATERIALS & FINISHES

Actuator	Polyamide
Case	Glass fiber reinforced polyamide
Seal	Nitrile butadiene rubber
Base	Glass fiber reinforced polyamide
Movable Contact	Phosphor bronze with gold plating
Stationary Contacts	Brass with silver plating
Terminals	Brass with silver plating

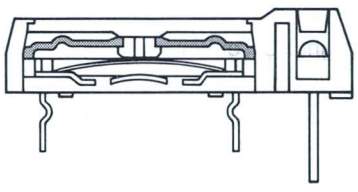
APPLICATIONS

These tact switches are designed for compact mounting and offer flexibility in panel design. JF switches are ideal for use in today's wide array of miniaturized equipment: medical measuring instruments and devices for measuring thickness, water quality, etc.; communication equipment; automated office machines; consumer electronics; video switchers, AV special effects equipment, and monitoring camera system controllers.

These single pole single throw, momentary devices are available in both illuminated and nonilluminated versions. Inscriptions are available upon request to the factory. They are styled with a black housing in contrast to the colored, round or square actuators. Spot illuminated models are offered with red, yellow, or green LEDs and with isolated lamp circuits. Actuators are available in a choice of five colors.

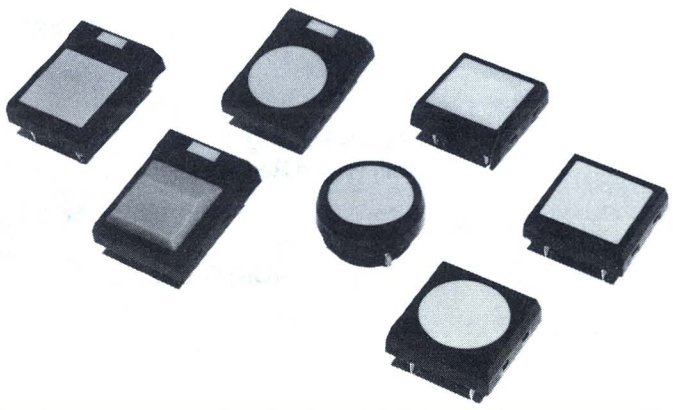
PROCESS SEALED & SPLASHPROOF

The contact mechanism is surrounded by a rubber seal which permits the switches to be subjected to time- and money-saving automated soldering methods. They can also be safely cleaned of flux using freon or alcohol based cleaning solvents. (Other solvents are not recommended.) Switches should not be operated or have any pressure on the actuators during washing.



MODEL VARIATIONS

Illuminated Nonilluminated



NKK SERIES JF KEYPAD SWITCHES

DOME CONTACT/LOW PROFILE/WASHABLE

TYPICAL SWITCH ORDERING EXAMPLE

JF	15	S	P	2	C	—	

POLE & CIRCUIT

15	SPST	OFF	(ON)
( ) = Momentary			

HOUSING SHAPES

Nonilluminated	
S	Square
C	Round (w/round actuator only)
Illuminated	
R	Rectangular

PC TERMINALS

P	Straight

ACTUATOR TYPES

1	Square
2	Round
3	Sculptured
See following detail page for housing/actuator combinations	

ACTUATOR COLORS

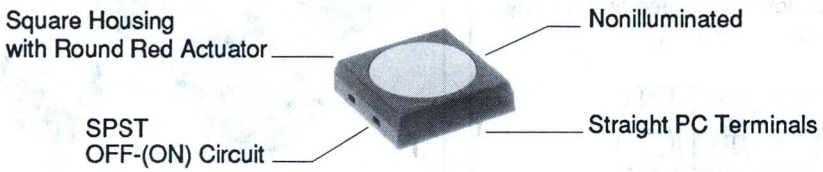
C	Red
D	Orange
F	Green
G	Blue
H	Gray

LED COLORS

C	Red
E	Yellow
F	Green

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (JF15SP2C):

SERIES JF KEYPAD



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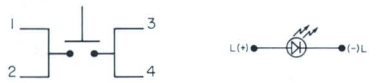
NKK SERIES JF KEYPAD SWITCHES

DOME CONTACT/LOW PROFILE/WASHABLE

POLE AND CIRCUIT

POLE & THROW	MODEL	ACTUATOR POSITION & TERMINAL NUMBERS ( ) = Momentary	
		Normal	Down
SPST	JF15	OFF	(ON)

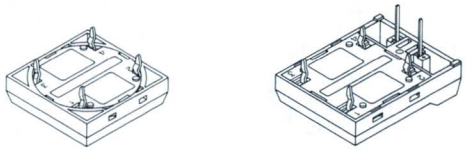
SCHEMATIC



Terminal numbers are actually on switch. LED circuit is isolated & requires external switch.

TERMINALS

P Straight PC Terminals



Nonilluminated

Illuminated (w/isolated lamp circuit)

Dimensions appear in the following drawings.
Soldering time & temperature: 5 seconds @ 270°C.

HOUSING & ACTUATOR TYPES

NONILLUMINATED

S Square Housing

1 Square Actuator

2 Round Actuator

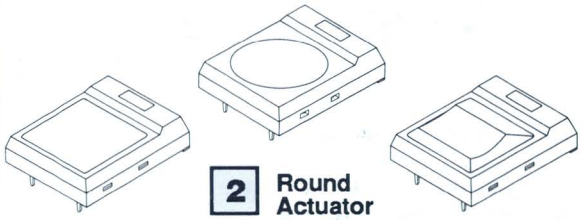
3 Sculptured Actuator

C Round Housing

2 Round Actuator

ILLUMINATED

R Rectangular Housing



1 Square Actuator

2 Round Actuator

3 Sculptured Actuator

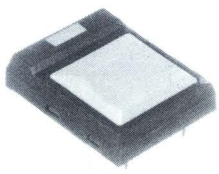
Actuator Colors: **C** Red **D** Orange **F** Green **G** Blue **H** Gray
LED Colors: **C** Red **E** Yellow **F** Green Contact the factory about legends.

LED SPECIFICATIONS

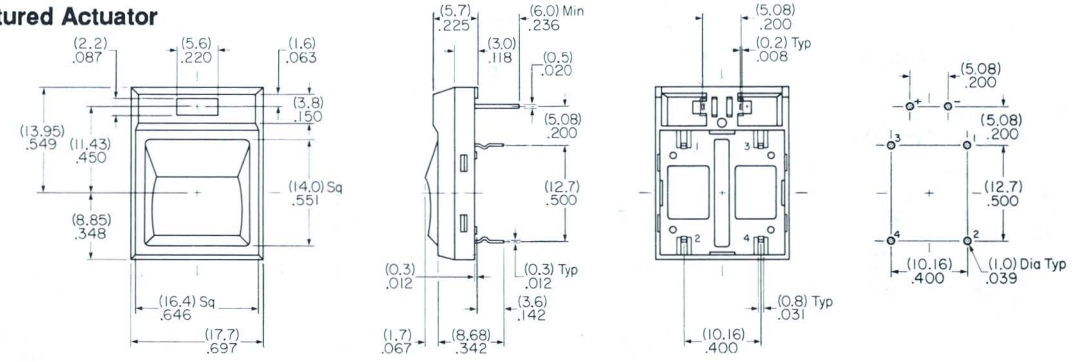
LEDs are supplied as an integral part of illuminated devices and are not available separately. LED polarity markings are on the bottom of the switch, The electrical specifications shown are determined at a basic temperature of 25°C. If the source voltage exceeds the rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula at the end of this catalog.

		Red	Yellow	Green
Forward Peak Current	I_{FM}	40mA	40mA	40mA
Continuous Forward Current	I_F	30mA	30mA	30mA
Forward Voltage	V_F	1.7V	2.2V	2.2V
Reverse Peak Voltage	V_{RM}	4V	4V	4V
Current Reduction Rate Above 25°C	ΔI_F	0.67mA/°C	0.67mA/°C	0.67mA/°C

Illuminated/with Sculptured Actuator



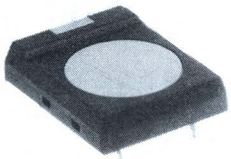
JF15RP3C-C Model Shown



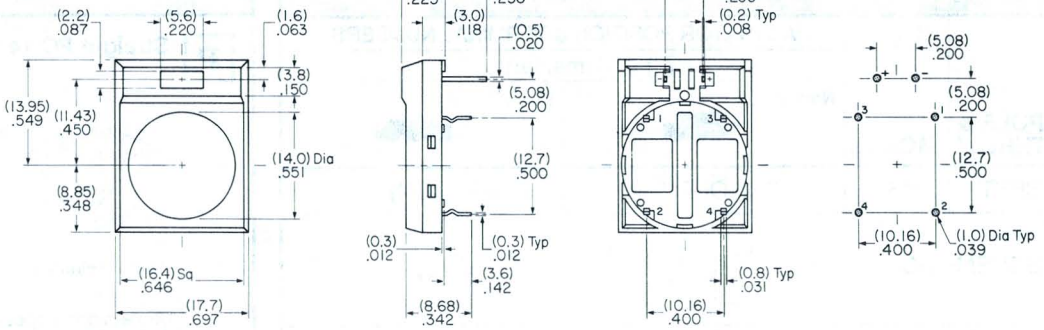
NKK SERIES JF KEYPAD SWITCHES

DOME CONTACT/LOW PROFILE/WASHABLE

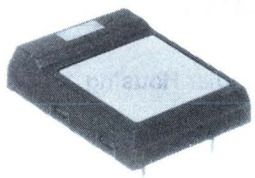
Illuminated/with Round Actuator



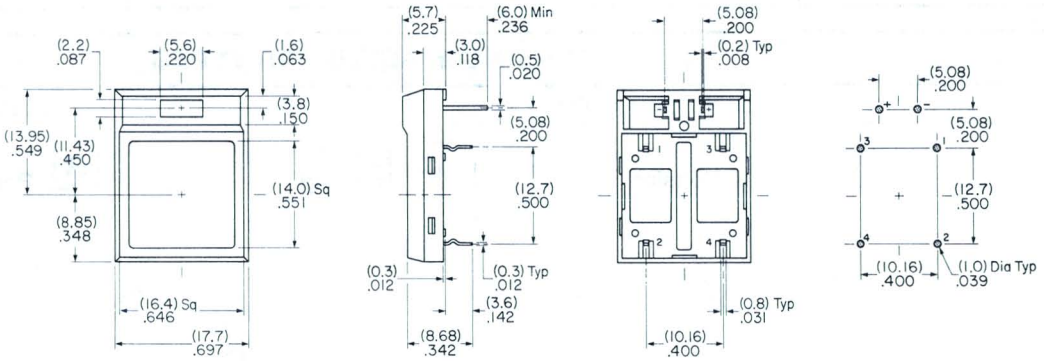
JF15RP2C-C Model Shown



Illuminated/with Square Actuator

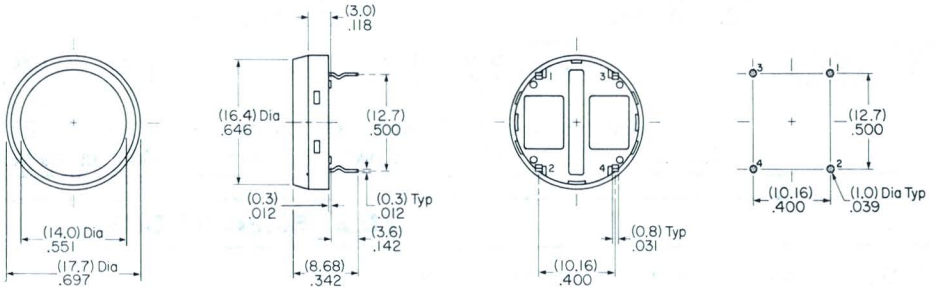


JF15RP1C-C Model Shown

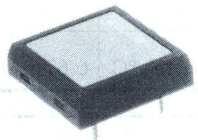


Nonilluminated/with Round Actuator in Round Housing

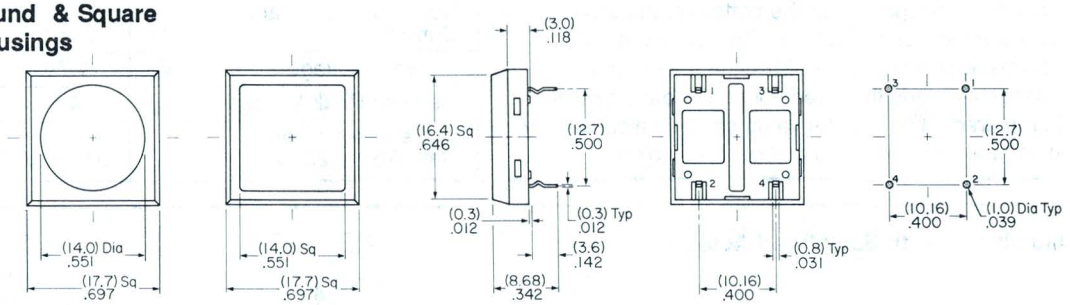
JF15CP2C Model Shown



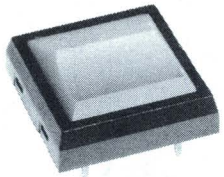
Nonilluminated/with Round & Square Actuators in Square Housings



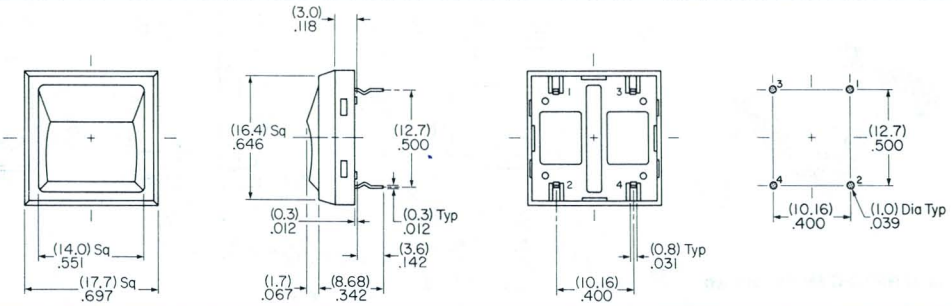
JF15SP1C Model Shown



Nonilluminated/ with Square Actuator



JF15SP3C Model Shown



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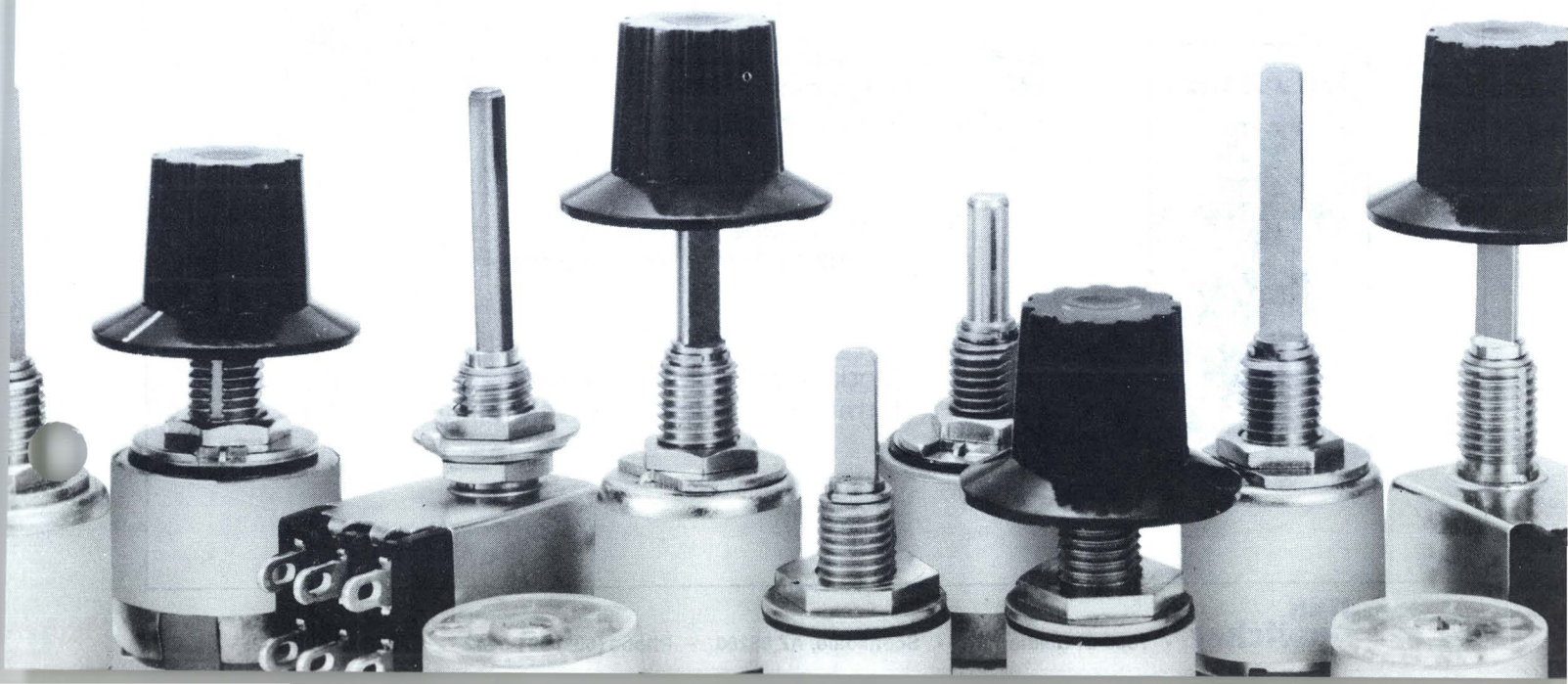
SERIES MR

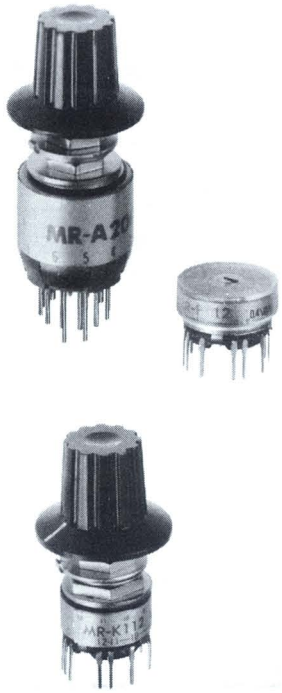
MINIATURE ROTARY SWITCHES



NKK SERIES MR

MINIATURE ROTARY SWITCHES

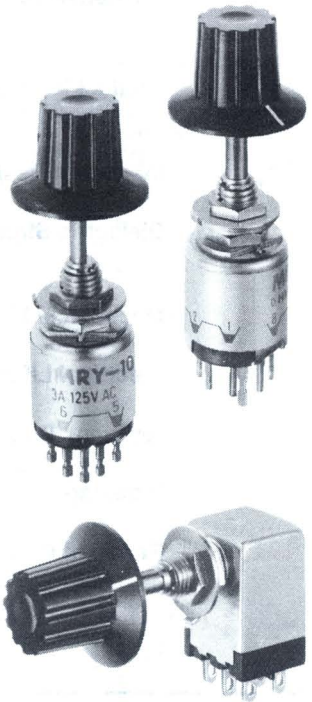
APPLICATIONS



NKK offers a wide variety of miniature, half-inch diameter rotaries in its MR Series. Shaft and screwdriver actuation; single, double, and four poles; fixed and adjustable stop settings, as well as continuous rotation; PC board and panel mounting capabilities--all are available for customer selection. Contact ratings range from 0.4VA maximum @ 28V maximum in the MRF and MRK devices to 10A @ 125V AC in the MRT22 device. Switches in the MR Series are designed with 30° indexing for the MRA, MRF, and MRK models, 45° for MRX, 60° for MRY and MRT23, and 120° for the MRT22 models.

All MR switches have molded-in terminals. The MRA, MRF, and MRK models have an interior housing seal for washability, and the MRF and MRK models have the added protection of a shaft rubber o-ring. The MRA and MRK devices also have an exterior rubber washer and double flatted bushing for splashproof applications. The polyamide cover of the MRF model provides exterior protection.

These half-inch diameter rotaries are suited to many applications, including communication equipment, test instruments, computers, computer peripherals, and medical apparatus.



MATERIALS & FINISHES

Shaft	Brass with nickel plating
Stopper Plate	Steel with zinc plating for MRA, MRK, MRX, and MRY Polyamide cover with stopper for MRF
Bushing/Housing	Zinc alloy with zinc plating for MRA, MRF, and MRK Brass with nickel plating for MRX, MRY, and MRT
Movable Contacts	Copper with silver plating for MRA Phosphor bronze with gold plating for MRF and MRK Silver alloy for MRX and MRT Copper with silver plating for MRY
End Contacts & Terminals	Brass with silver plating for MRA Phosphor bronze with gold plating for MRF and MRK Copper with silver plating for MRX and MRT Silver alloy plus brass with silver plating for MRY
Common Contacts & Terminals	Brass with silver plating for MRA Phosphor bronze with gold plating for MRF and MRK Copper with silver plating for MRX, MRY, and MRT22 Brass with silver plating for MRT23
Base	Diallylphthalate for MRA Fiberglass reinforced polyamide for MRF and MRK Phenolic resin for MRX, MRY, and MRT

CONTACT MECHANISM

All models are break before make (nonshorting).

MRA Self-cleaning, sliding contact
MRF Self-cleaning, rotary contactor disk
MRK Self-cleaning, rotary contactor disk
MRX Self-cleaning, sliding contact
MRY Rotary contactor dish
MRT Butt contacts

UL RECOGNITION

These MRT models are recognized by Underwriters Laboratories Inc. at the following ratings:
MRT22 10A @ 125V AC
MRT23 5A @ 125V AC
UL File Number E44145

Rotaries

NKK SERIES MR ROTARY SWITCHES

HALF-INCH DIA./WASHABLE/ENCLOSED/SINGLE DECK

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	250mA @ 125V AC or 48V DC for MRA 0.4VA maximum @ 28V maximumAC/DC for MRF & MRK (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	10 milliohms maximum for MRA 50 milliohms maximum for MRF & MRK
Insulation Resistance:	100 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum for MRA 500V AC minimum for MRF & MRK
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through 158°F)
Indexing:	30°
Range of Operating Torque:	250 ~ 750 grams-cm for MRA 50 ~ 250 grams-cm for MRF & MRK

TYPICAL SWITCH ORDERING EXAMPLE

MR **A** **112**

ACTUATORS & TERMINALS	
A	Shaft Actuated w/PC Terminals
F	Low Profile Screwdriver Actuated w/PC Terminals
K	Low Profile Shaft Actuated w/PC Terminals

POLES & CIRCUITS	
112	SP with 2-12 positions
206	DP with 2-6 positions
403	4P with 2-3 positions

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MRA112):

SERIES MR ROTARY

Note: One knob is supplied with each switch.

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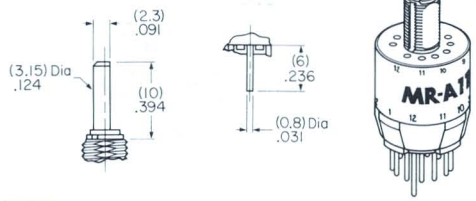
NKK SERIES MR ROTARY SWITCHES

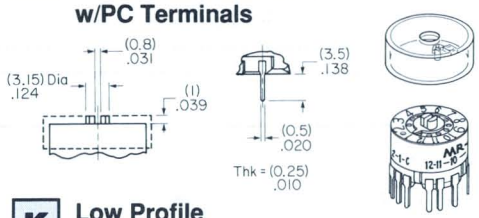
HALF-INCH DIA./WASHABLE/ENCLOSED/SINGLE DECK

ACTUATORS & TERMINALS

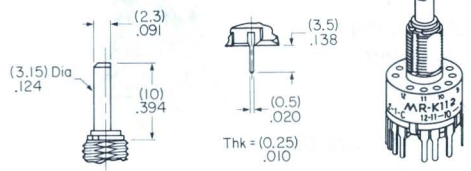
A **Shaft Actuated w/PC Terminals**



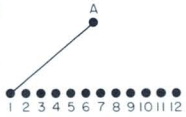
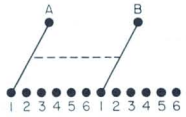
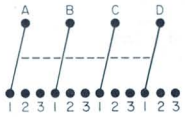
F **Low Profile Screwdriver Actuated w/PC Terminals**



K **Low Profile Shaft Actuated w/PC Terminals**



POLES & CIRCUITS

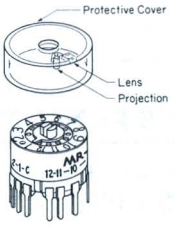
POLE	MODEL	NUMBER OF POSITIONS	STOPPER SETTINGS	NUMBER OF TERMINALS
SP	MRA112	2-12	2, 3, 4, . . . 12	1 COMM, 12 LOAD
	MRF112	2-12	2, 3, 4, . . . 12	1 COMM, 12 LOAD
	MRK112	2-12	2, 3, 4, . . . 12	1 COMM, 12 LOAD
SCHEMATIC				
DP	MRA206	2-6	2, 3, 4, 5, 6	2 COMM, 12 LOAD
	MRF206	2-6	2, 3, 4, 5, 6	2 COMM, 12 LOAD
	MRK206	2-6	2, 3, 4, 5, 6	2 COMM, 12 LOAD
SCHEMATIC				
4P	MRA403	2-3	2, 3	4 COMM, 12 LOAD
	MRF403	2-3	2, 3	4 COMM, 12 LOAD
	MRK403	2-3	2, 3	4 COMM, 12 LOAD
SCHEMATIC				

POSITION SETTING

Each switch is supplied with the stopper set for the maximum number of positions allowed for that model. Prior to installation, the desired position setting should be made.

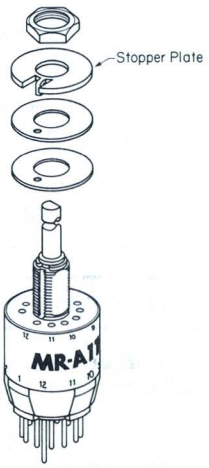
MRF Models:

1. Remove the protective cover from the switch body.
2. Turn the shaft counterclockwise to the extreme left by using a screwdriver.
3. Inside the cover is a magnifying lens which should be positioned over the number which is to be the maximum position used; when the cover is then snapped onto the switch, the projection beside the lens fits into the correct hole for setting the stop.



MRA and MRK Models:

1. Using the actuator knob, turn the shaft counterclockwise to the extreme left. If the shaft is not turned counterclockwise to the extreme left, proper setting cannot be achieved. At this extreme position, the white line on the knob points to the number 1 position shown on the side of the switch.
2. Remove the knob from the shaft and loosen the nut far enough to allow raising the stopper plate for resetting to the desired position.
3. Note the position numbers on the side of the switch; these correspond to the terminal numbers and stopper holes. Insert the stopper in the hole numbered for the maximum desired number of stop settings. Satisfactory switch funtioning cannot be assured if the stopper plate is not properly positioned.
4. Tighten the nut (beveled side up) firmly against the stopper plate.



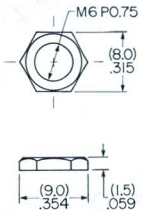
Rotaries

NKK SERIES MR ROTARY SWITCHES

HALF-INCH DIA./WASHABLE/ENCLOSED/SINGLE DECK

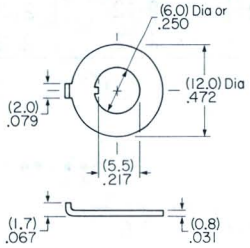
STANDARD MOUNTING HARDWARE

AT513M Hexagon Nut
Brass, nickel plated



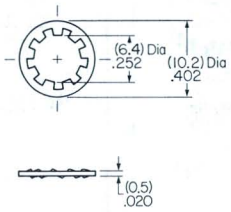
2 for MRA; 1 for MRK

AT507M Locking Ring
Steel, chromate over zinc plating



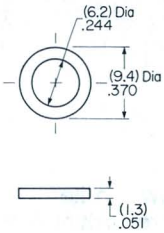
1 for MRA

AT509 Lockwasher
Steel, chromate over zinc plating



1 for MRA

AT535 Rubber Ring
Nitrile butadiene rubber

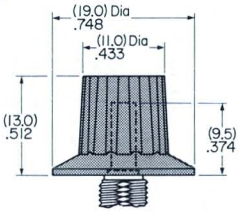


1 for MRK

KNOBS

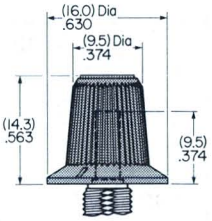
AT433
Plain Black

Polyacetal Black only (supplied)



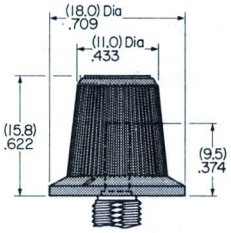
AT4103 Short
Color Tipped

Polyester with polyamide tip
Black Base
Tip Colors:
A, B, C,
E, F, G, H
(order separately)



AT4104 Long
Color Tipped

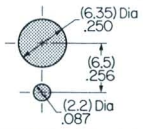
Polyester with polyamide tip
Black Base
Tip Colors:
A, B, C,
E, F, G, H
(order separately)



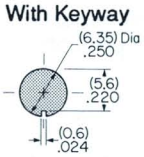
PANEL CUTOUTS

Nonsealed Panel

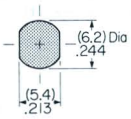
Without Keyway



With Keyway



Sealed Panel



MAXIMUM EFFECTIVE PANEL THICKNESS

With Standard Hardware on Nonsealed Panel:
MRA 1.7mm (.067") MRK 2.2mm (.087")

Without Locking Ring on Nonsealed Panel:
MRA 2.5mm (.098") MRK 3.0mm (.118")

With Standard Hardware on Sealed Panel:
MRK 2.7mm (.106")

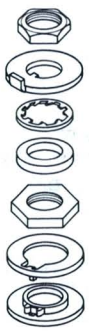
INSTALLATION & SOLDERING

The MRK devices are designed to be panel mounted.
Installation without panel mounting will affect reliability.

Soldering Limits:
3 seconds @ 350°C or 5 seconds @ 270°C

HARDWARE ASSEMBLY

Standard Mounting Hardware Packaged Loose with Each Switch:



Hex Face Nut

Locking Ring

Lockwasher

Rubber Washer (MRK)

Factory Assembled:

Hex Nut

Stopper Plate

Metal Washer

Rubber Washer (MRA)

Rotaries

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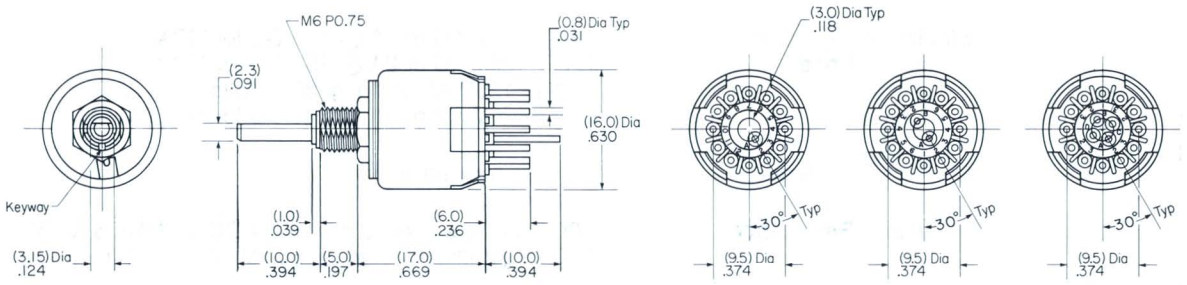
NKK SERIES MR ROTARY SWITCHES

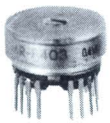
HALF-INCH DIA./WASHABLE/ENCLOSED/SINGLE DECK

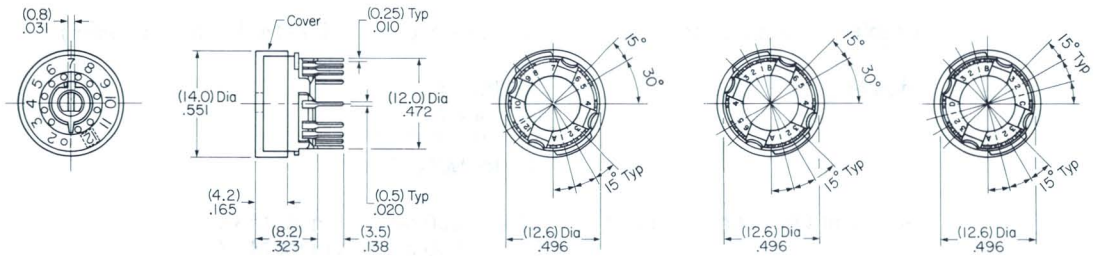
MRA/PC Terminals/1, 2, & 4 Pole



MRA112 Model Shown

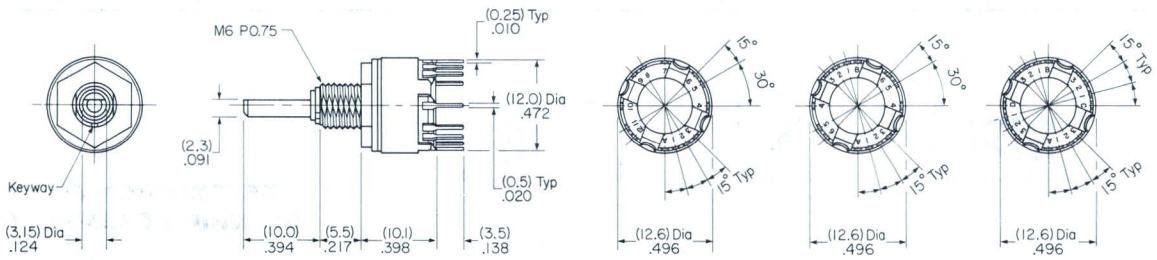
MRF/PC Terminals/1, 2, & 4 Pole





MRF112 Model Shown

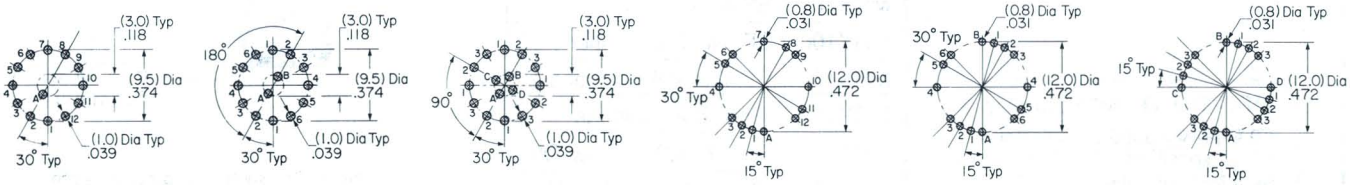
MRK/PC Terminals/1, 2, & 4 Pole



MRK112 Model Shown

FOOTPRINTS

Single Pole MRA112	Double Pole MRA206	Four Pole MRA403	Single Pole MRF112 MRK112	Double Pole MRF206 MRK206	Four Pole MRF403 MRK403



Rotaries

NKK SERIES MR ROTARY SWITCHES

HALF-INCH DIA./ENCLOSED/SINGLE DECK

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	2A @ 125V AC or 1A @ 30V DC for MRX 3A @ 125V AC or 2A @ 30V DC for MRY 10A @ 125V AC or 4A @ 30V DC for MRT22 5A @ 125V AC or 3A @ 30V DC for MRT23
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	100 megohms minimum @ 500V DC for MRX & MRY 200 megohms minimum @ 500 V DC for MRT
Dielectric Strength:	1,000V AC minimum
Mechanical Life:	15,000 operations minimum
Electrical Life:	7,500 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through 158°F)
Indexing:	45° for MRX 60° for MRY 120° for MRT22 60° for MRT23
Range of Operating Torque:	500 ~ 1500 grams-cm for MRX 500 ~ 1000 grams-cm for MRY 200 ~ 500 grams-cm for MRT

TYPICAL SWITCH ORDERING EXAMPLE

MR **X** **108**

ACTUATORS & TERMINALS	
X	Shaft Actuated w/PC -Turret Terminals
Y	Shaft Actuated w/Turret Terminals
T	Shaft Actuated w/Solder Lug Terminals

POLES & CIRCUITS	
MRX108	SP with 2-8 positions
MRY106	SP with 2-6 positions
MRX204	DP with 2-4 positions
MRX402	4P with 2 positions
MRT22	DPDT ON-NONE-ON
MRT23	DPDT ON-OFF-ON

IMPORTANT: MRT switches are supplied without UL marking unless specified. See Supplement for instructions.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MRX108):

SERIES MR ROTARY

Note: One knob is supplied with each switch.

Rotaries

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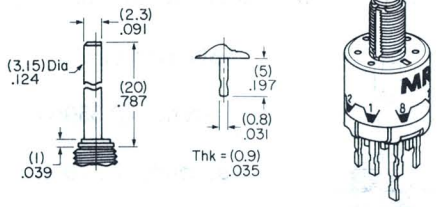
NKK SERIES MR ROTARY SWITCHES

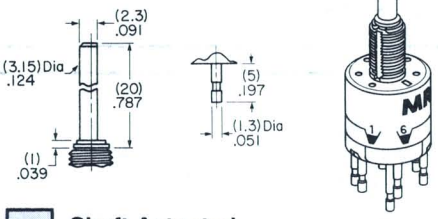
HALF-INCH DIA./ENCLOSED/SINGLE DECK

ACTUATORS & TERMINALS

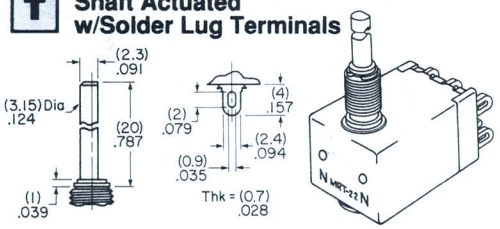
X **Shaft Actuated w/PC-Turret Terminals**



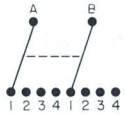
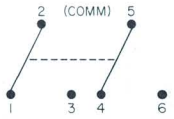
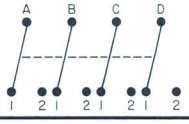
Y **Shaft Actuated w/Turret Terminals**



T **Shaft Actuated w/Solder Lug Terminals**



POLES & CIRCUITS

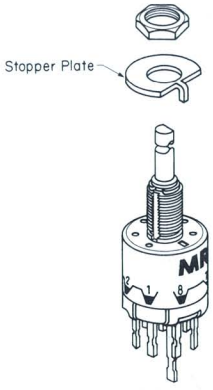
POLE	MODEL	NUMBER OF POSITIONS	STOPPER SETTINGS	NUMBER OF TERMINALS
SP	MRX108	2-8	2, 3, 4, . . . 8	1 COMM, 8 LOAD
	MRY106	2-6	2, 3, 4, . . . 6	1 COMM, 6 LOAD
SCHEMATIC				
DP	MRX204	2-4	2, 3, 4	2 COMM, 8 LOAD
SCHEMATIC				
DPDT	MRT22	2	ON-NONE-ON	2-3 2-1 5-6 5-4
	MRT23	3	ON-OFF-ON	2-3 open 2-1 5-6 open 5-4
SCHEMATIC				
4P	MRX402	2	1 & 2	4 COMM, 8 LOAD
SCHEMATIC				

POSITION SETTING

Each switch is supplied with the stopper set for the maximum number of positions allowed for that model. Prior to installation, the desired position setting should be made.

MRX and MRY Models:

1. Using the actuator knob, turn the shaft counterclockwise to the extreme left. If the shaft is not turned counterclockwise to the extreme left, proper setting cannot be achieved. At this extreme position, the white line on the knob points to the number 1 position shown on the side of the switch.
2. Remove the knob from the shaft and loosen the nut far enough to allow raising the stopper plate for resetting to the desired position.
3. Note the position numbers on the side of the switch; these correspond to the terminal numbers and stopper holes. Insert the stopper in the hole numbered for the maximum desired number of stop settings. Satisfactory switch funtioning cannot be assured if the stopper plate is not properly positioned.
4. Tighten the nut (beveled side up) firmly against the stopper plate.



KNOBS

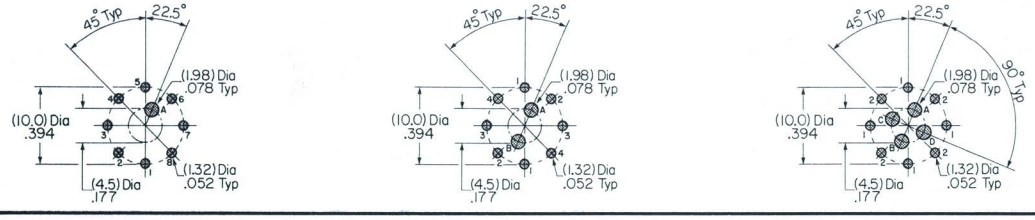
AT433
Plain Black
(supplied with switch)

AT4103
Short Color Tipped
(must be ordered separately)

AT4104
Long Color Tipped
(must be ordered separately)

Cap details are on page K6 where materials, colors, and dimensions are shown.

PC FOOTPRINTS FOR MRX 1, 2, & 4 POLE



NKK SERIES MR ROTARY SWITCHES

HALF-INCH DIA./ENCLOSED/SINGLE DECK

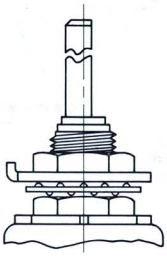
MOUNTING & SOLDERING

The standard mounting hardware supplied with each switch is hex nut AT513M (2 for MRT), locking ring AT507M, and lock-washer AT509. Dimension drawings of this hardware, panel cutouts, and knob AT433 are shown in the previous section.

Maximum Effective Panel Thickness

With Standard Hardware:
MRX & MRY 2.4mm (.095")
MRT 2.7mm (.106")

Without Locking Ring:
MRX & MRY 3.2mm (.126")
MRY 3.5mm (.138")

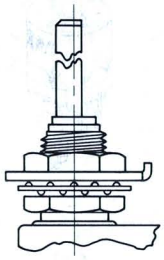


Standard Hardware Packaged Loose

Factory assembled:

Hex Nut

Stopper Plate

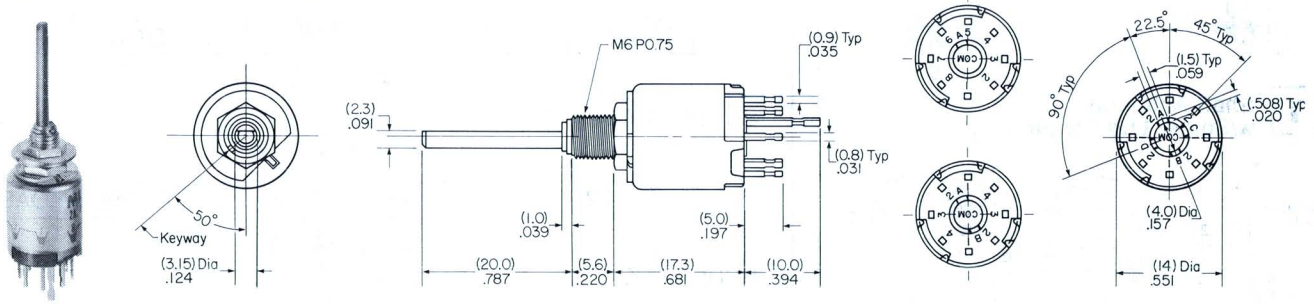


Soldering Limits:

3 seconds @ 350°C

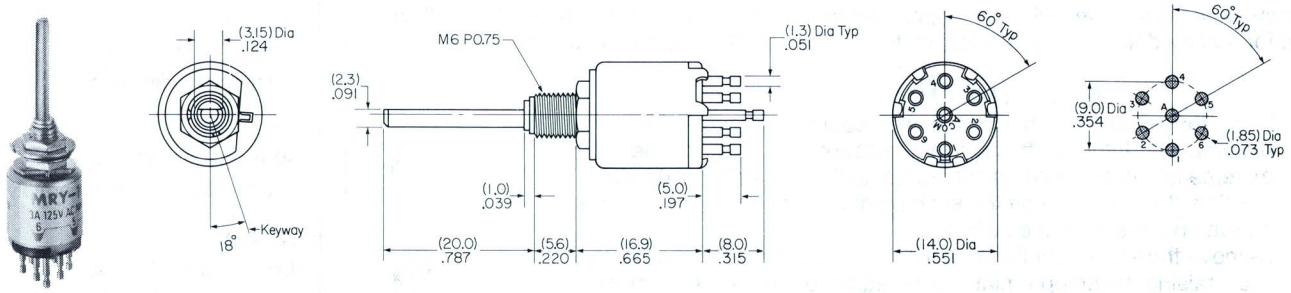
5 seconds @ 270°C

MRX/PC-Turret Terminals/1, 2, & 4 Pole



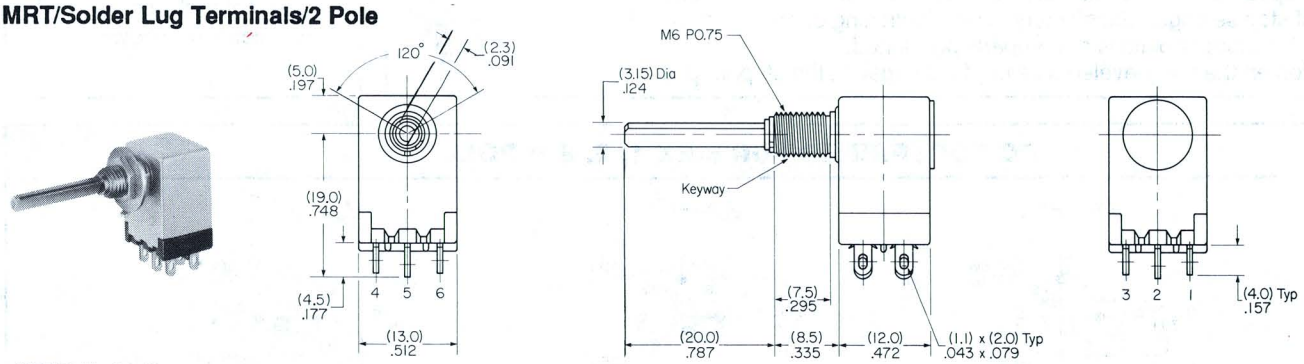
MRX108 Model Shown

MRY/Turret Terminals/1 Pole



MRY106 Model Shown

MRT/Solder Lug Terminals/2 Pole



MRT22 Model Shown

Rotaries

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NKK SERIES MR ROTARY SWITCHES

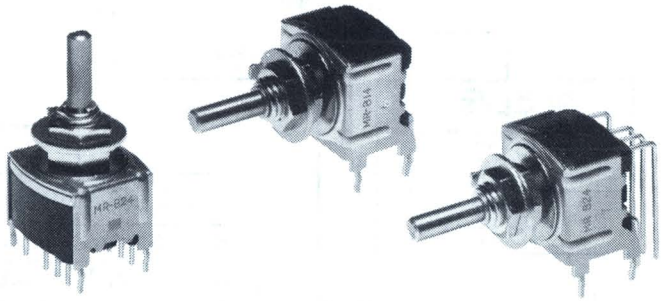
WASHABLE/BRACKETED PC/BUSHING MOUNT

APPLICATIONS

The MRB Series of bracketed rotary devices is particularly designed for panel mountability; the combination of installing the bushing in a panel plus soldering terminals to a PC board increases mounting stability. These switches are available in single and double pole versions, with straight or right angle PC terminals, with on-none-on and on-on-on circuits, and with a rating of 0.4VA maximum @ 28V AC/DC maximum. MRB switches have break-before-make contacts.

Washability is achieved with a combination of features that provide protection for the contacts: an o-ring within the bushing, a seal between the frame and base, plus epoxy sealed terminals. An exterior rubber washer is available to provide panel seal.

Like the other MR models, MRB switches are suited for applications such as communication equipment, test instruments, computers, computer peripherals, and medical apparatus.



GENERAL SPECIFICATIONS

Electrical Capacity: **(Resistive Load)**	0.4VA maximum @ 28V AC/DC maximum (Applicable Range: 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	80 milliohms maximum
Insulation Resistance:	100 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through 158°F)
Indexing:	45° for ON-ON-ON & 90° for ON-NONE-ON
Operating Torque:	370 grams-cm average

ACTUAL SIZE

MATERIALS & FINISHES

Shaft	Brass with nickel plating
Bushing	Zinc alloy with nickel plating
Frame/Bracket	Steel with tin-lead plating
Movable Contacts	Phosphor bronze with gold plating over nickel
Stationary Contacts	Copper with gold plating over nickel
Terminals	Brass with tin-lead plating
Base	Glass fiber reinforced polybutylene terephthalate

SERIES MR ROTARY SWITCHES

WASHABLE/BRACKETED PC/BUSHING MOUNT

TYPICAL SWITCH ORDERING EXAMPLE

MRB **1** **2** **B**

POLES	
1	SPDT SP3T
2	DPDT DP3T

PC TERMINALS	
B	Straight with Bracket
H	Right Angle w/Bracket

CIRCUITS			
2	ON	NONE	ON
4	ON	ON	ON

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MRB12B):

SERIES MR ROTARY

SPDT with ON-NONE-ON Circuit

Straight PC Terminals with Bracket

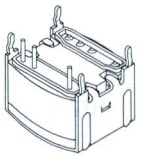
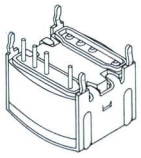
POLES & CIRCUITS

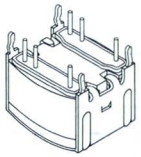
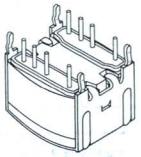
POLE & THROW	MODEL	ACTUATOR POSITION & TERMINAL NUMBERS Position 1	Position 2 Opposite Keyway	Position 3
SPDT	MRB12	ON	NONE	ON
Connected Terminals		C1-1	OPEN	C1-2
SCHEMATICS				
DPDT	MRB22	ON	NONE	ON
Connected Terminals		C1-1 C2-4	OPEN	C1-2 C2-5
SCHEMATICS				
SP3T	MRB14	ON	ON	ON
Connected Terminals		C1-1	C1-2	C1-3
SCHEMATICS				
DP3T	MRB24	ON	ON	ON
Connected Terminals		C1-1 C2-4	C1-2 C2-5	C1-3 C2-6
SCHEMATICS				

Terminal numbers are not actually on the switch.

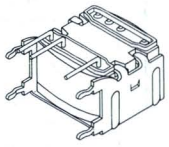
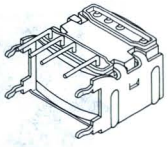
PC TERMINALS

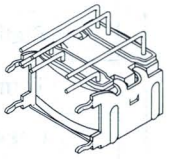
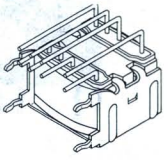
B Straight PC Terminals with Bracket

SPDT  SP3T 

DPDT  DP3T 

H Right Angle PC Terminals with Bracket

SPDT  SP3T 

DPDT  DP3T 

Rotaries

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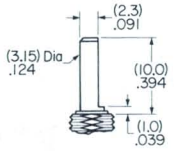
NKK SERIES MR ROTARY SWITCHES

WASHABLE/BRACKETED PC/BUSHING MOUNT

KNOBS

Knobs are not supplied with the MRB switches, but are available from NKK.

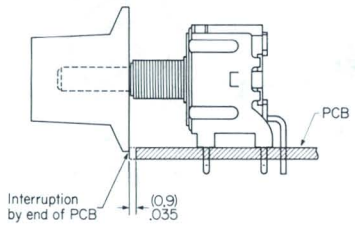


Knobs which fit the flatted shaft (as illustrated here) include AT433 Plain Black, AT4103 Short Color Tipped, and AT4104 Long Color Tipped.

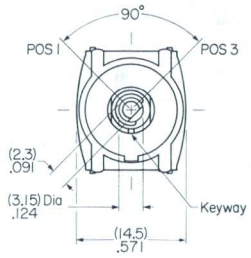
Detailed descriptions and drawings of knobs are shown in this section on page K6.

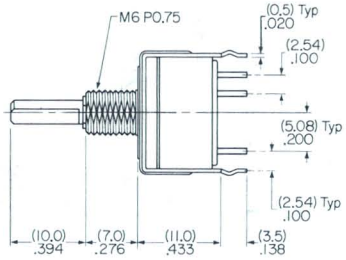
MOUNTING PRECAUTION

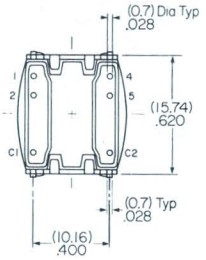
When mounting a right angle switch, a cap clearance of 0.9mm (.035") is recommended.

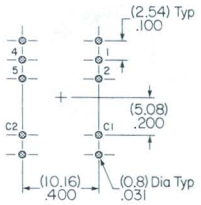


MRB/Straight PC Terminals with Bracket/Single & Double Pole/Double Throw/90° Indexing



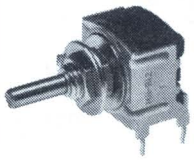


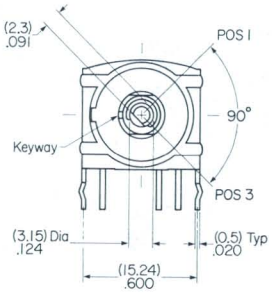


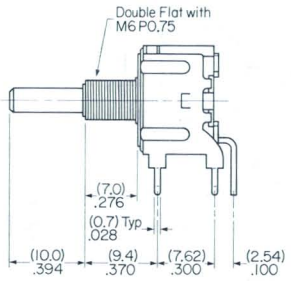


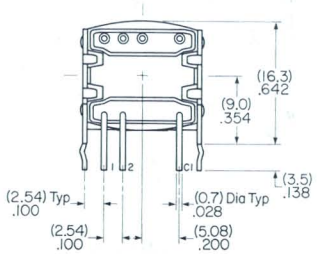
MRB12B Model Shown Actuator shown in Position 1. Single pole model does not have terminals 4, 5, & C2.

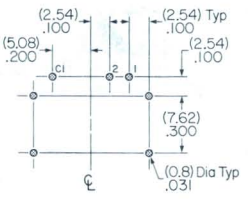
MRB/Right Angle PC Terminals/Single Pole/Double Throw/90° Indexing





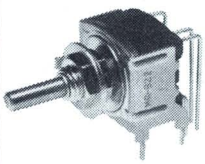


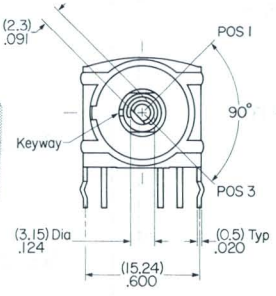


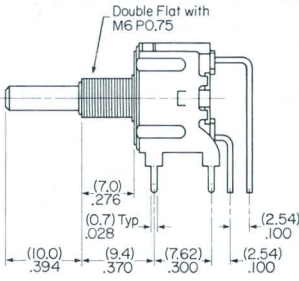


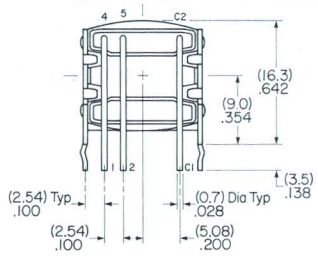
MRB12H Model Shown Actuator shown in Position 1.

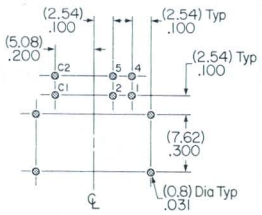
MRB/Right Angle PC Terminals/Double Pole/Double Throw/90° Indexing











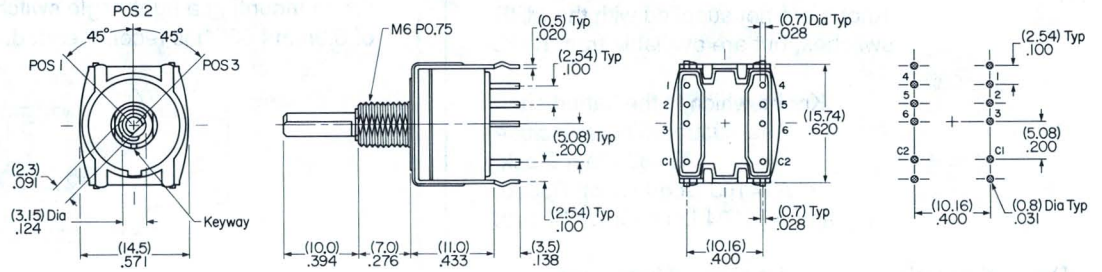
MRB22H Model Shown Actuator shown in Position 1.

Rotaries

SERIES MR ROTARY SWITCHES

WASHABLE/BRACKETED PC/BUSHING MOUNT

MRB/Straight PC Terminals with Bracket/Single & Double Pole/Three Throw/45° Indexing

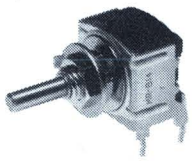


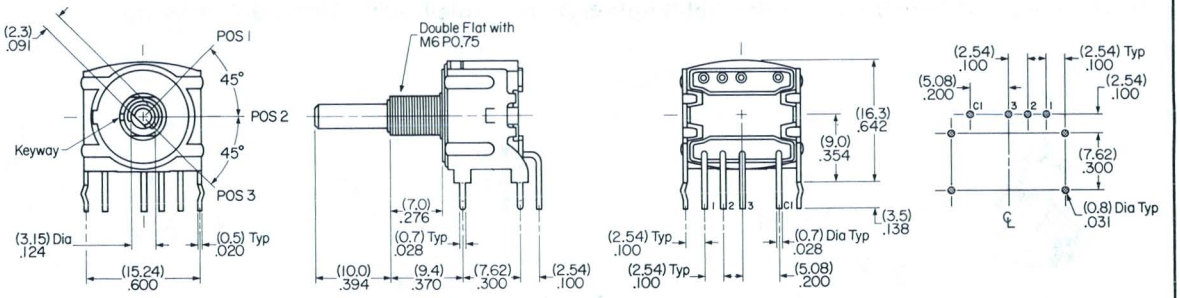
MRB14B Model Shown

Actuator shown in Position 1.

Single pole model does not have terminals 4, 5, 6, & C2.

MRB/Right Angle PC Terminals/Single Pole/Three Throw/45° Indexing

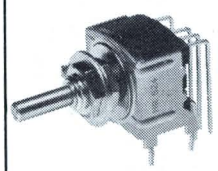


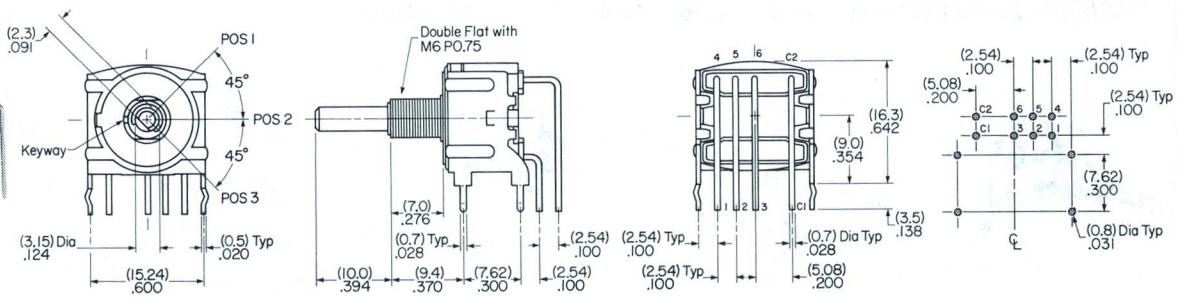


MRB14H Model Shown

Actuator shown in Position 1.

MRB/Right Angle PC Terminals/Double Pole/Three Throw/45° Indexing





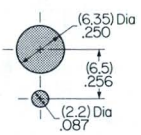
MRB24H Model Shown

Actuator shown in Position 1.

PANEL CUTOUTS & PANEL THICKNESS

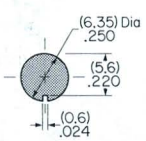
Standard Hardware Supplied with Switch: 2 AT513M Hex Nuts, 1 AT507M Locking Ring, & 1 AT509 Lockwasher. AT535 Rubber Ring is available for Panel Seal. (Descriptions & drawings are on page K6.)

Nonsealed Panel



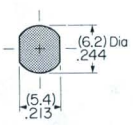
W/Standard Hardware
2.2mm (.087")

Nonsealed Panel



Without Locking Ring
3.0mm (.118")

Sealed Panel



With 2 Hex Nuts &
Rubber Ring 4.2mm (.165")

SOLDERING

Time & Temperature Limits

3 seconds @ 350°C

or

5 seconds @ 270°C

Rotaries

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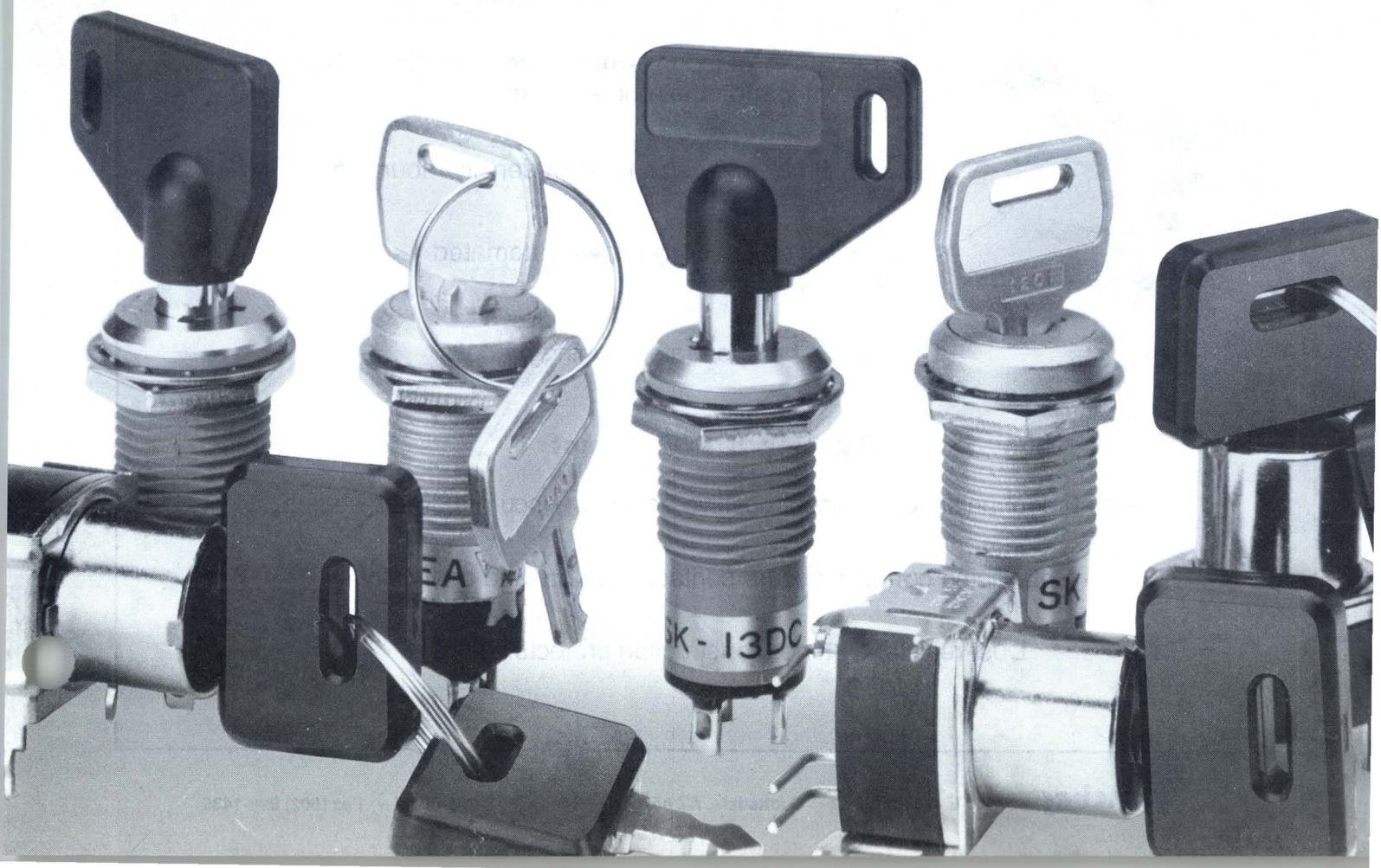
SERIES SK

COMPACT KEYLOCK SWITCHES



NKK SERIES SK KEYLOCK SWITCHES

COMPACT/3 AMP/BUSHING MOUNTABLE

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	3A @ 125V AC
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	30,000 cycles minimum
Electrical Life:	10,000 cycles minimum
Operating Torque:	270 grams-cm (3.74 ounce-in) average
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F) Low Security models -25°C through +70°C (-13°F through 158°F) High Security models

APPLICATIONS

SK Series answers the need for highly reliable, space efficient keylock devices. These switches are used in various settings such as cash register access keys, electronic security boxes, computer peripheral devices, and small programmable controllers. Both low security and high security devices are available.

The low security models are recognized by Underwriters Laboratories Inc. under file number E44145 and certified by Canadian Standards Association under file numbers LR23535 and LR56017. All SK keylocks are offered with 2 positions (90° step) or 3 positions (45° step) and have a variety of key removable positions.

CONTAMINANT RESISTANCE

Due to the indirect path created by the design of the interior actuator mechanism, these switches resist the intrusion of dust and other contaminants.

Further protection to the contacts is provided by epoxy sealing the terminals to lock out flux and other contaminants.

MATERIALS & FINISHES

	Low Security Models	High Security Models
Key	Die cast zinc alloy with chrome plating	Brass with chrome plating & ABS resin handle
Cover (Housing Top)	Die cast zinc alloy with chrome plating	Brass with matte finish chrome plating
Housing/Bushing	Die cast zinc alloy w/matte finish chrome plating	Glass fiber reinforced polyamide
Base	Phenolic resin (thermoset)	Phenolic resin (thermoset)
Movable Contactor	Silver alloy	Silver alloy
Stationary Contacts	Silver capped copper with silver plating	Silver capped copper with silver plating
Terminals	Copper or brass with silver plating	Copper or brass with silver plating

NKK SERIES SK KEYLOCK SWITCHES

COMPACT/3 AMP/BUSHING MOUNTABLE

TYPICAL SWITCH ORDERING EXAMPLE

SK	1	2B	A	W	01

POLES

1	SPDT

LOCK MECHANISM

A	Low Security
C	High Security

TERMINAL

01	Solder Lug

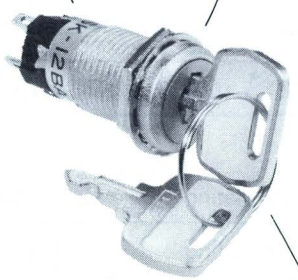
CIRCUITS & KEY REMOVABLE POSITIONS

Code	Pos. 1	Pos. 2	Pos. 3	Key Removes
2A	ON	NONE	ON	Positions 1 & 3
2B	ON	NONE	ON	Position 1
3D	ON	OFF	ON	Positions 1, 2, 3
3E	ON	OFF	ON	Position 2

CONTACT MATERIAL

W	Silver Rated 3A @ 125V AC

DESCRIPTION FOR TYPICAL KEYLOCK ORDERING EXAMPLE: (SK12BAW01)



Silver Contacts Rated 3A @ 125V AC

12mm Diameter Bushing

Solder Lug Terminals

SPDT ON-NONE-ON Circuit
Key Removable in Position 1

2 keys supplied with each switch; use AT4081 part number to order extras; dimensions appear in the Accessories section.

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

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NKK SERIES SK KEYLOCK SWITCHES

COMPACT/3 AMP/BUSHING MOUNTABLE

POLES, CIRCUITS, & KEY-REMOVABLE POSITIONS

POLE & THROW	MODEL NUMBER	CIRCUIT POSITIONS	CONNECTED TERMINALS POS 1	POS 2	POS 3	KEY REMOVABLE	ANGULAR THROW	LOCK POSITION
SPDT	SK12A	ON-NONE-ON	COM-1	--------	COM-2	Position 1 & 3	90°	
SPDT	SK12B	ON-NONE-ON	COM-1	--------	COM-2	Position 1	90°	
SPDT	SK13D	ON-OFF-ON	COM-1	OPEN	COM-2	Positions 1, 2, 3	45°	
SPDT	SK13E	ON-OFF-ON	COM-1	OPEN	COM-2	Position 2	45°	
Terminal numbers are on the switch.						◉ = Key Removable		Key-end View

KEY REMOVABLE

A Positions 1 & 3 (90° angular throw)

B Position 1 (90° angular throw)

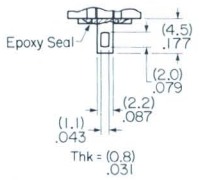
D Positions 1, 2, & 3 (45° angular throw)

E Position 2 (45° angular throw)

CONTACTS & TERMINALS

W Silver over Silver Rated 3A @ 125V AC

01 Solder Lug Terminals

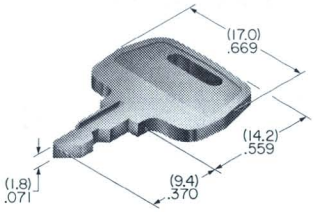


LOCK MECHANISM

A Low Security Mechanism with 3 tumblers

Key Material:
Chromate over zinc alloy

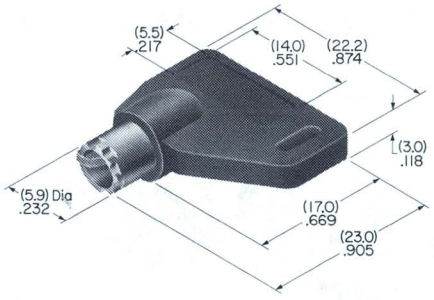
2 keys provided with each switch
(no master key available)
Use part number AT4081 to order separately.



C High Security Mechanism with 6 tumblers

Key Materials:
Brass w/matte finish chrome plating & ABS Resin Handle

2 numbered keys supplied with each switch; 200 different numbered keys (no master key available). Use AT9412 part number plus, individual 3-digit key number to order additional keys. Example: AT9412-123 for switch SK13DCW01-123.

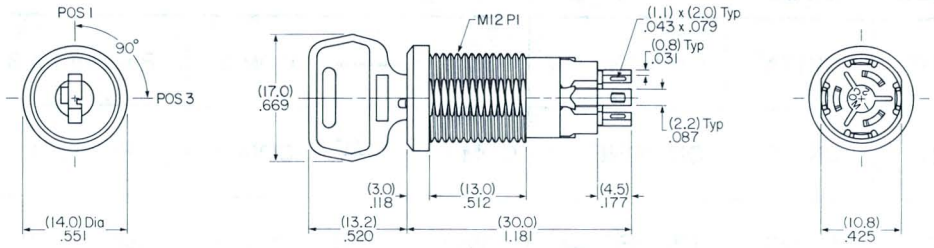


Keylocks

NKK SERIES SK KEYLOCK SWITCHES

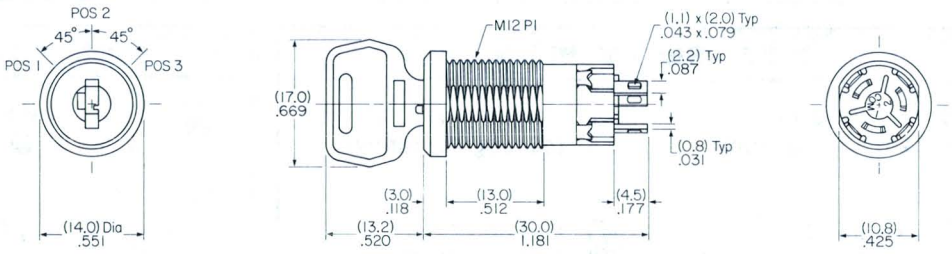
COMPACT/3 AMP/BUSHING MOUNTABLE

A Low Security/90° Angular Throw/Solder Lug Terminals/Single Pole Double Throw



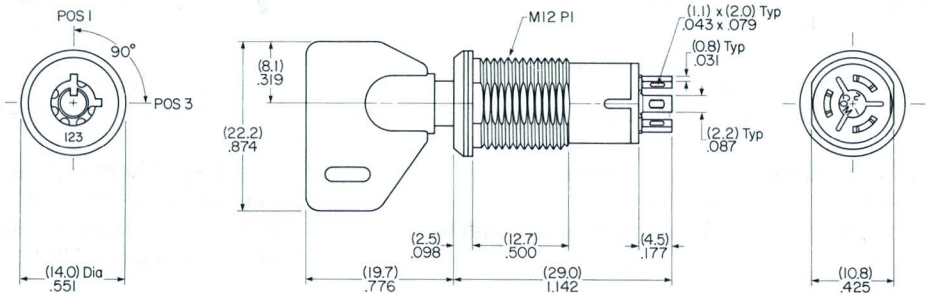
SK12BAW01 Model Shown

A Low Security/45° Angular Throw/Solder Lug Terminals/Single Pole Double Throw



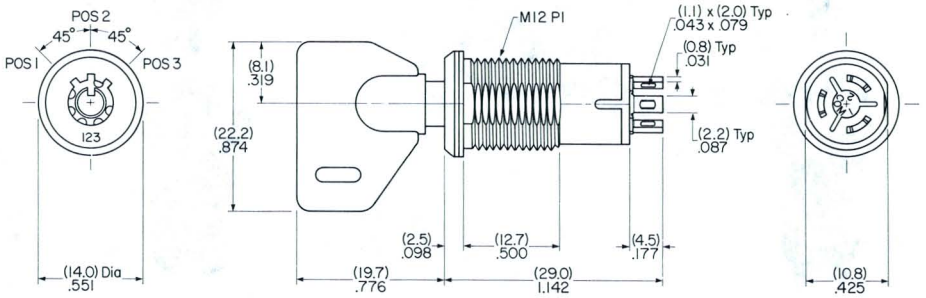
SK13EAW01 Model Shown

C High Security/90° Angular Throw/Solder Lug Terminals/Single Pole Double Throw



SK12ACW01 Model Shown

C High Security/45° Angular Throw/Solder Lug Terminals/Single Pole Double Throw



SK13DCW01 Model Shown

Keylocks

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NKK SERIES SK KEYLOCK SWITCHES

COMPACT/3 AMP/BUSHING MOUNTABLE

WIRING & SOLDERING

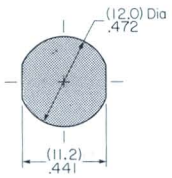
Solder lug terminals have a .043" x .079" hole which accommodates 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

SOLDERING LIMITS

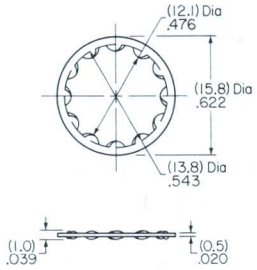
The soldering time and temperature limits are
3 seconds at 350°C
5 seconds at 270°C.

PANEL CUTOUT & STANDARD MOUNTING HARDWARE

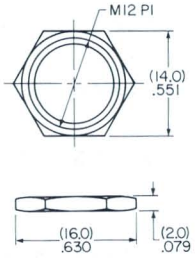
Maximum Effective Panel Thickness
8.0mm (.315")



AT508
Locking ring (1 per switch)
Steel with chromate over zinc



AT527M
Hex Mounting Nut (1 per switch)
Steel with nickel plating



Keylocks

NKK SERIES SK KEYLOCK SWITCHES

COMPACT/WASHABLE/PCB MOUNTABLE

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	0.4VA maximum @ 28V AC/DC maxaimum (Applicable Range: 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	80 milliohms maximum
Insulation Resistance:	100 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	30,000 cycles minimum
Electrical Life:	10,000 cycles minimum
Operating Torque:	270 grams-cm (3.74 ounce-in) average for momentary action models 210 grams-cm (2.91 ounce-in) average for maintained action models
Ambient Temp Range:	-25°C through +70°C (-13°F through +158°F)

APPLICATIONS

SK Series answers the need for highly reliable, space efficient keylock devices. These switches are used in various low security applications such as modems, test equipment, controllers, and other compact devices.

These keylocks are offered with either 2 positions (90° step) or 3 positions (45° step) and have a variety of key removable positions. A single tumbler plate is used in the PCB mounting models.

SEALED CONSTRUCTION

PCB mountable SK keylock switches are designed with three features which seal out contaminants. A gasket is placed between the base and the housing, terminals are insert molded, and a dip cap is provided so these PCB mounting devices can undergo wave soldering and automated washing conditions with complete safety to the switch mechanism.

MATERIALS & FINISHES

Key	Brass with ABS resin
Tumbler Barrel	Polyacetal
Bushing	Die cast zinc alloy with bright chrome plating
Housing	Steel with nickel plating
Base	Glass fiber reinforced polyamide
Movable Contactor	Phosphor bronze with gold plating
Stationary Contacts	Copper with gold plating
Terminals	Brass with tin-lead plating

SOLDERING & WASHING

Soldering Time & Temperature Limits

3 seconds @ 350°C
5 seconds @ 270°
5 seconds @ 250°C for plated-through holes

Washing Recommendation

Freon or alcohol based cleaning solutions are recommended.

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NKK SERIES SK KEYLOCK SWITCHES

COMPACT/WASHABLE/PCB MOUNTABLE

TYPICAL SWITCH ORDERING EXAMPLE

SK 2 4 E G 30

POLES	
1	SPDT SP3T
2	DPDT DP3T

CONTACT MATERIAL	
G	Gold Rated 0.4VA @ 28V AC/DC

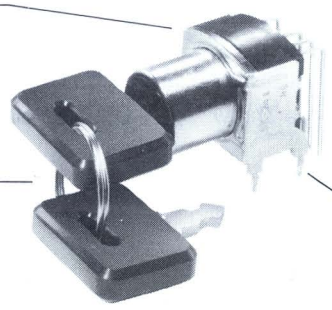
PC TERMINALS	
13	Straight w/Bracket
30	Right Angle

CIRCUITS & KEY REMOVABLE POSITIONS				
Code	Pos.1	Pos. 2	Pos. 3	Key Removes
2A	ON	NONE	ON	Positions 1 & 3
2B	ON	NONE	ON	Position 1
5B	ON	NONE	(ON)	Position 1
*4D	ON	ON	ON	Positions 1, 2, 3
*4E	ON	ON	ON	Position 2

( ) = Momentary
* Can be used as ON-OFF-ON circuit

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (SK24EG30)

SERIES SK KEYLOCK

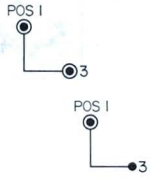
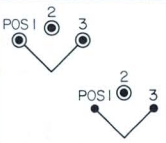


Keylocks

NKK SERIES SK KEYLOCK SWITCHES

COMPACT/WASHABLE/PCB MOUNTABLE

POLES & CIRCUITS

POLE & THROW	MODEL NUMBER	CIRCUIT POSITIONS	CONNECTED TERMINALS POS 1	POS 2	POS 3	KEY REMOVABLE	ANGULAR THROW	LOCK POSITION
SPDT	SK12A SK12B SK15B	ON-NONE-ON ON-NONE ON ON-NONE-(ON)	C1-1	------	C1-2	Positions 1 & 3 Position 1 Position 1	90°	
DPDT	SK22A SK22B SK25B	ON-NONE-ON ON-NONE-ON ON-NONE-(ON)	C1-1, C2-4	------	C1-2, C2-5	Positions 1 & 3 Position 1 Position 1		
SP3T	SK14D SK14E	ON-ON-ON ON-ON-ON	C1-1	C1-2	C1-3	Positions 1, 2, 3 Position 2	45°	
DP3T	SK24D SK24E	ON-ON-ON ON-ON-ON	C1-1, C2-4	C1-2 C2-5	C1-3 C2-6	Positions 1, 2, 3 Position 2		
Terminal numbers are not actually on the switch.				◉ = Key Removable				Key-end View

KEY REMOVABLE

- **A** Positions 1 & 3 (90° angular throw)
- **B** Position 1 (90° angular throw)
- **D** Positions 1, 2, & 3 (45° angular throw)
- **E** Position 2 (45° angular throw)

CONTACT MATERIAL

- **G** Gold Rated 0.4VA @ 28 V AC

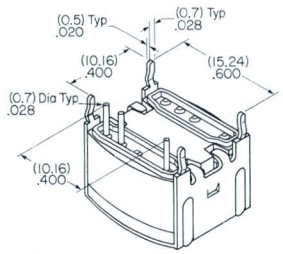
DISPOSABLE BOOT

One polyvinyl chloride disposable boot is packaged with each switch. In order to place the boot on the switch before washing, the key must first be removed.

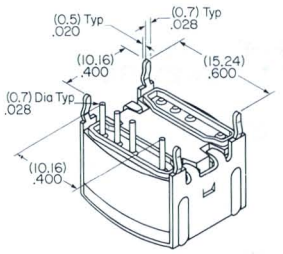
PC TERMINALS

13 Straight PC Terminals with Bracket

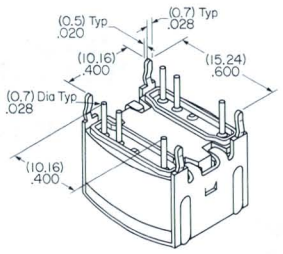
Single Pole Double Throw



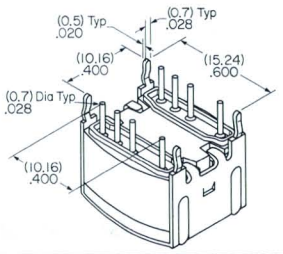
Single Pole Three Throw



Double Pole Double Throw

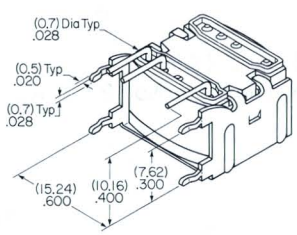


Double Pole Three Throw

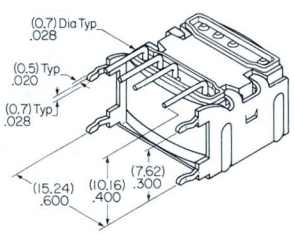


30 Right Angle PC Terminals

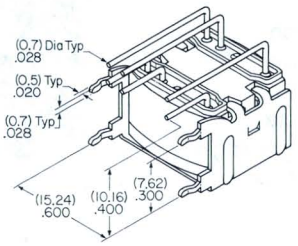
Single Pole Double Throw



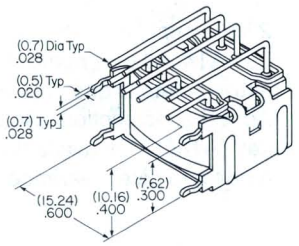
Single Pole Three Throw



Double Pole Double Throw



Double Pole Three Throw



Keylocks

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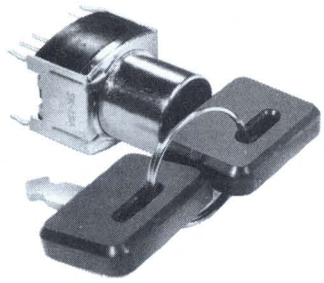
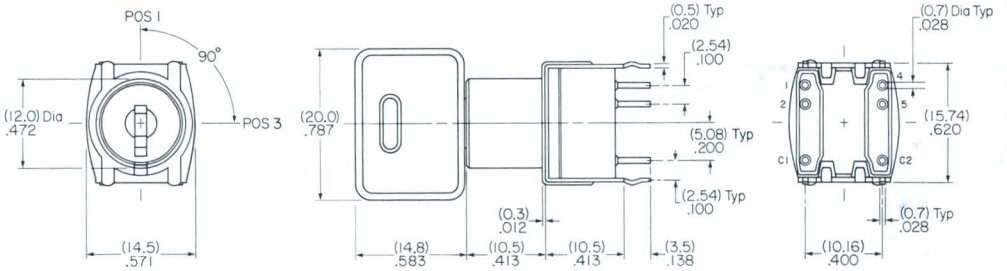
NKK SERIES SK KEYLOCK SWITCHES

COMPACT/WASHABLE/PCB MOUNTABLE

Straight PC Terminals with Bracket/Single Pole Double Throw & Double Pole Double Throw

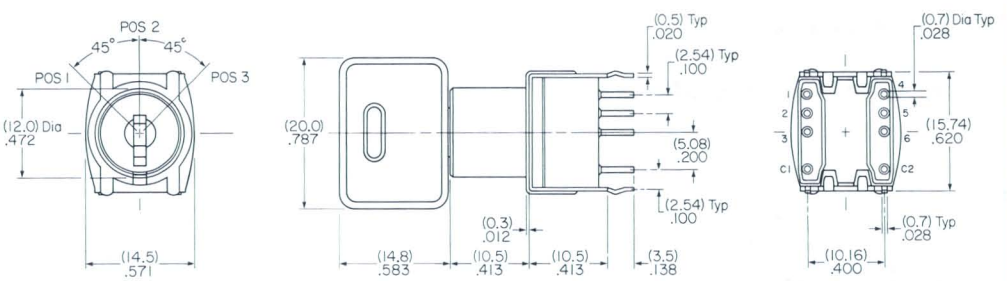




SK12AG13 Model Shown

Single pole models have only terminals 1, 2, & C1.

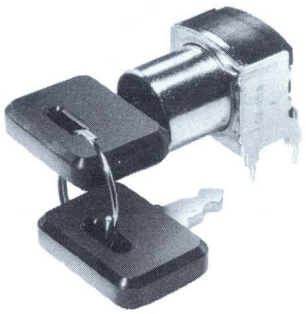
Straight PC Terminals with Bracket/Single Pole Three Throw & Double Pole Three Throw

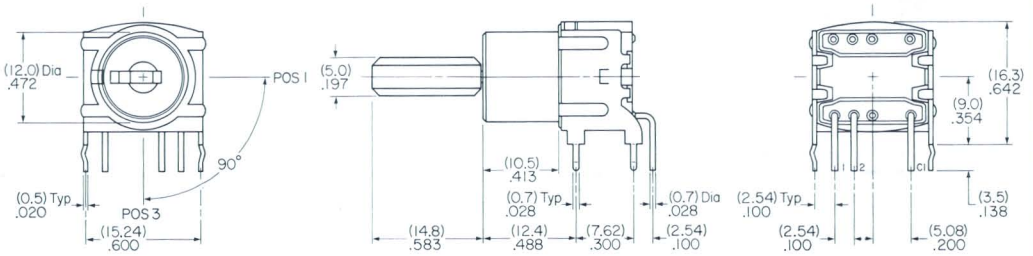


SK24DG13 Model Shown

Single pole models have only terminals 1, 2, 3, & C1.

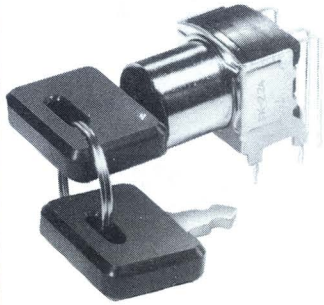
Right Angle PC Terminals/Single Pole Double Throw

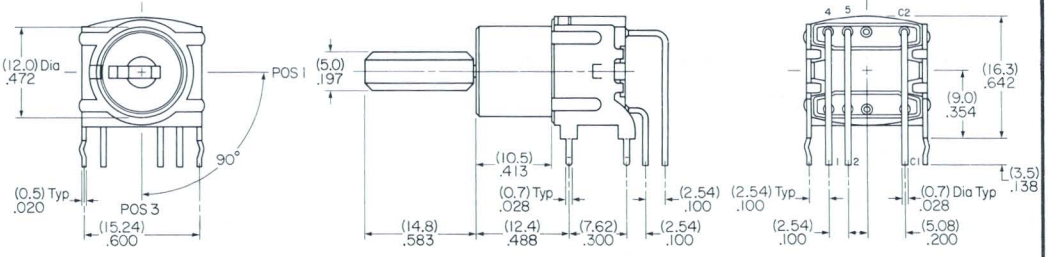




SK15BG30 Model Shown

Right Angle PC Terminals/Double Pole Double Throw





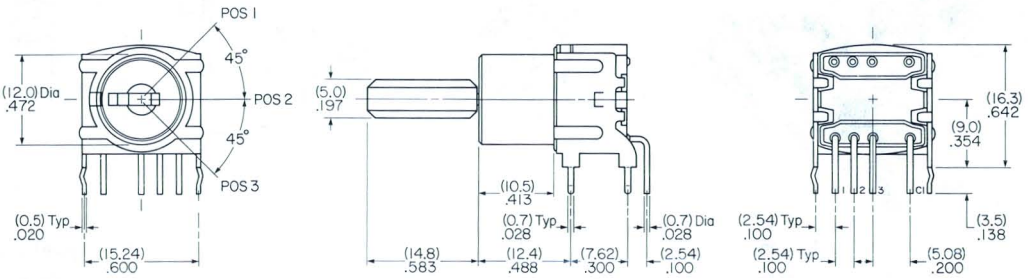
SK22AG30 Model Shown

Keylocks

NKK SERIES SK KEYLOCK SWITCHES

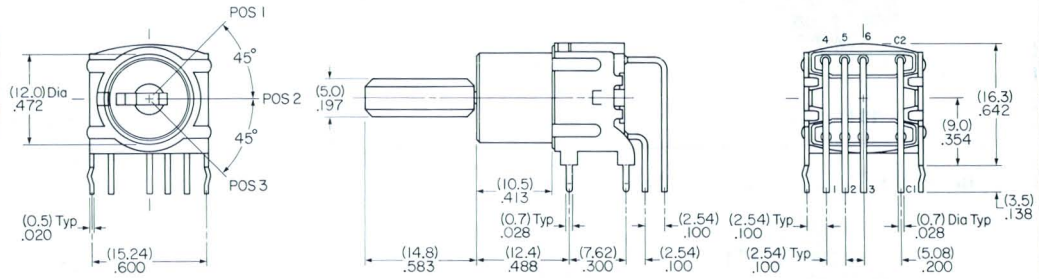
COMPACT/WASHABLE/PCB MOUNTABLE

Right Angle PC Terminals/Single Pole Three Throw



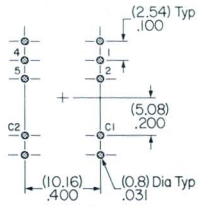
SK14DG30 Model Shown

Right Angle PC Terminals/Double Pole Three Throw

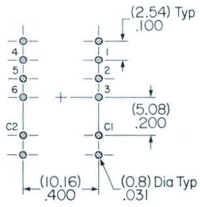


SK24EG30 Model Shown

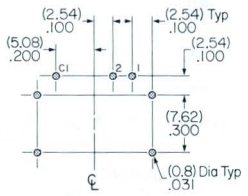
PC Footprints



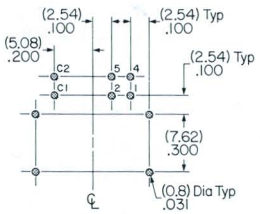
Straight SPDT/DPDT
Single pole models have terminals 1, 2, & C1.



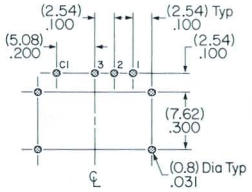
Straight SP3T/DP3T
Single pole models have terminals 1, 2, 3, & C1.



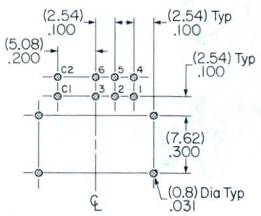
Right Angle SPDT



Right Angle DPDT



Right Angle SP3T



Right Angle DP3T

Keylocks

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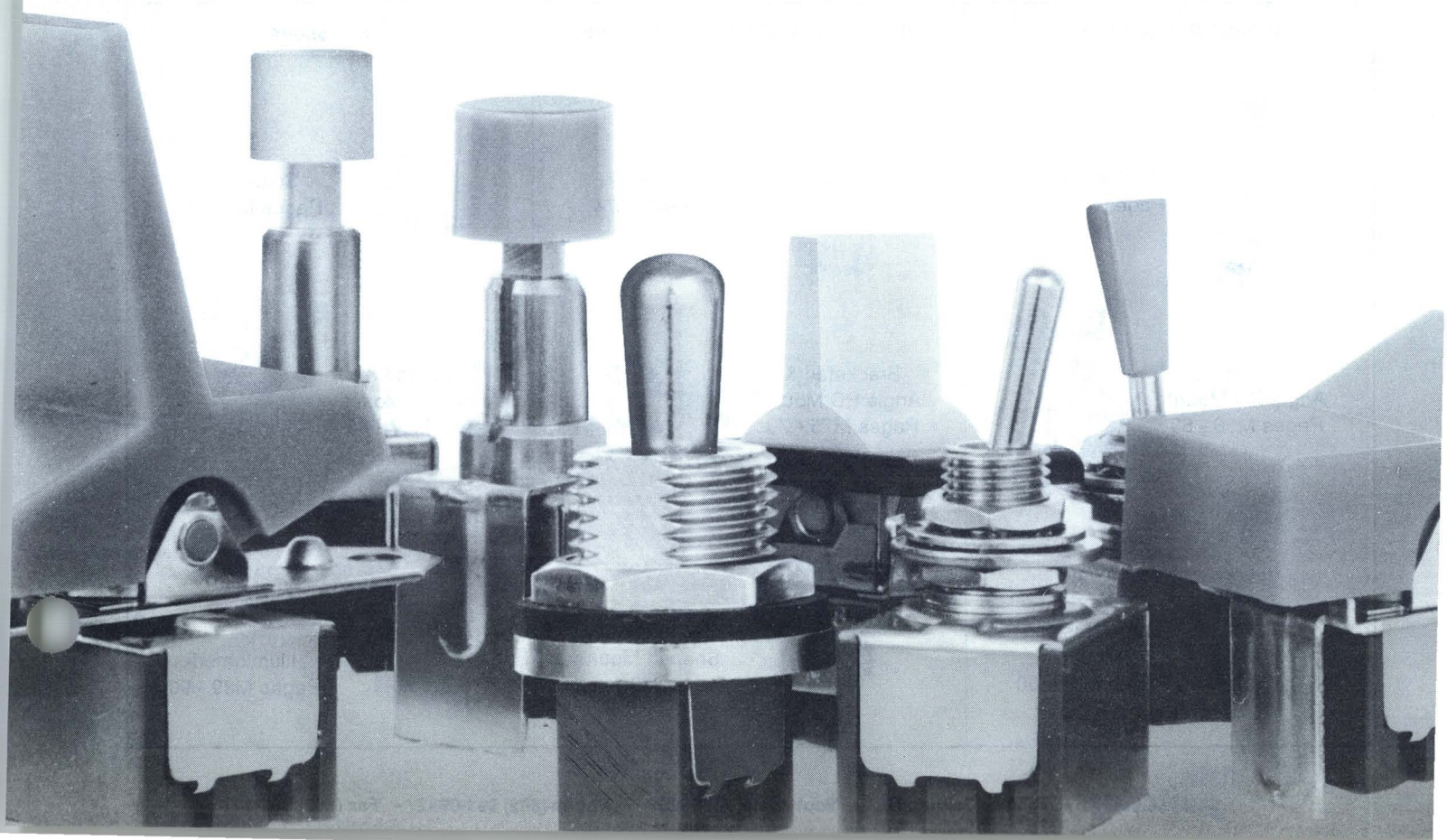
SERIES M

SUBMINIATURE SWITCHES

● TOGGLES ● ROCKERS

● PUSHBUTTONS ● SLIDES



NKK SERIES M

SUBMINIATURE/MULTI-FUNCTION

DISTINCTIVE FEATURES

Antirotation feature is standard on noncylindrical levers.

Antijamming design on toggle switches protects contacts from damage due to excessive downward force on the actuator.

High torque bushing construction prevents rotation or separation from frame during installation.

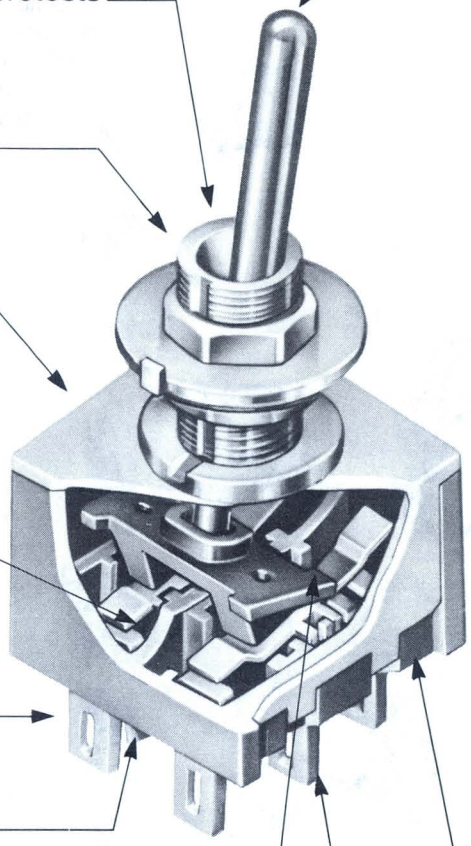
Stainless steel frame resists corrosion.

Patented silver contacts of specially composed alloy for hardness.

High insulating barriers, formed in the molded diallylphthalate case, increase isolation of circuits in multipole devices and provide added protection to contact points.

Epoxy sealed terminals prevent entry of solder flux and other contaminants.

Prominent external insulating barriers increase insulation resistance and dielectric strength.



Actual Size

Interlocked actuator block prevents switch failure due to biased lever movement.

Longer center solder lug terminal simplifies wiring and soldering.

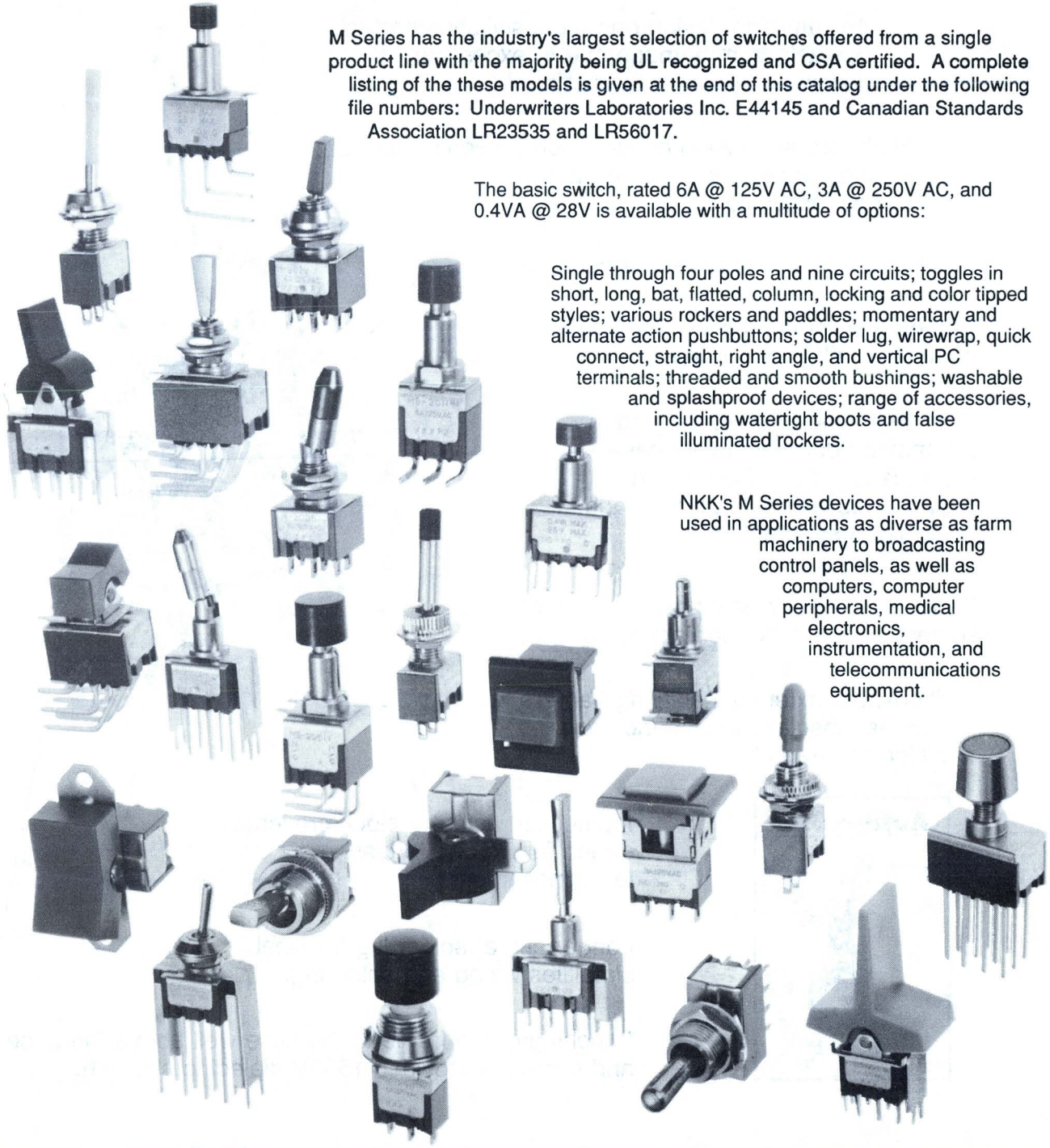
Clinching of the frame to the case well above the base and terminals provides 1500V dielectric strength.

NKK SERIES M

SUBMINIATURE/MULTI-FUNCTION

APPLICATION DATA

M Series is the flagship of the NKK product line. This series of subminiature switches is NKK's broadest, most widely accepted line. It is the series that established NKK as a world leader in the subminiature electronic switch industry.



M Series has the industry's largest selection of switches offered from a single product line with the majority being UL recognized and CSA certified. A complete listing of the these models is given at the end of this catalog under the following file numbers: Underwriters Laboratories Inc. E44145 and Canadian Standards Association LR23535 and LR56017.

The basic switch, rated 6A @ 125V AC, 3A @ 250V AC, and 0.4VA @ 28V is available with a multitude of options:

Single through four poles and nine circuits; toggles in short, long, bat, flatted, column, locking and color tipped styles; various rockers and paddles; momentary and alternate action pushbuttons; solder lug, wirewrap, quick connect, straight, right angle, and vertical PC terminals; threaded and smooth bushings; washable and splashproof devices; range of accessories, including watertight boots and false illuminated rockers.

NKK's M Series devices have been used in applications as diverse as farm machinery to broadcasting control panels, as well as computers, computer peripherals, medical electronics, instrumentation, and telecommunications equipment.

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NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION

GENERAL SPECIFICATIONS

Electrical Capacity: **(Resistive Load)**	6A @ 125V AC & 3A @ 250V AC 6A @ 30V DC 0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	10 milliohms maximum for silver 20 milliohms maximum for gold
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	100,000 operations minimum 50,000 operations minimum for flat, locking, & splashproof devices
Electrical Life:	25,000 operations minimum for silver 50,000 operations minimum for gold
Ambient Temp Range:	-15°C through +85°C (+5°F through +185°F) Optional low temperature lubricant available
Toggle Angle of Throw:	25°
Nominal Operating Force:	400 grams for Single Pole 450 grams for Double Pole 700 grams for Three Pole 800 grams for Four Pole

MATERIALS & FINISHES

Toggle	Brass with chrome plating
Bushing	Brass with nickel plating
Frame	Stainless steel
Case	Diallylphthalate resin
Movable Contactor	Phosphor bronze with silver or gold plating*
Movable Contacts	Silver alloy (code W); or silver alloy with gold plating* over nickel (code A); or copper with gold plating* over nickel (code G)
Stationary Contacts	Silver with silver plating (code W); or silver with gold plating* over nickel (code A); or copper or brass with gold plating* over nickel (code G)
Terminals	Copper or brass with silver plating; or copper or brass with gold plating over nickel

* Gold plating on contacts is 1 micron minimum.

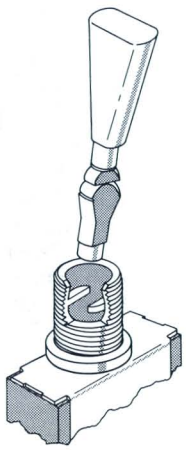
BIAS GUARD

When the lever is pushed in a diagonal direction instead of the mechanism's direction of operation, biased movement is transmitted to the actuator block and causes misalignment of contacts. However, internal construction of the M Series case prevents this biased movement.

ANTIROTATION DESIGN

Three of the M Series toggle types are designed with the antirotation feature: the flatted toggles which are coded E, E2, E3, E4, F and R; the locking levers L and L1; and the snap top toggles which receive the paddle cap and which are coded K1 and K2.

The bottom portion of all these toggles has two flatted sides which fit into a complementary opening inside the bushing. Turning of the toggle is prevented by the specially designed fit of these two structures.



NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/UNBRACKETED

TYPICAL UNBRACKETED

M20 1 3 S S1

POLES

1	SPST SPDT
2	DPST DPDT SP3T
3	3PDT
4	4PDT DP3T

CIRCUITS

1*	ON	NONE	OFF
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
4*	ON	ON	ON
6*	(ON)	ON	(ON)
7*	ON	ON	(ON)

( ) = Momentary

*ON-NONE-OFF circuit available in single and double pole only. 3-ON circuits available with double and four pole bases only.

TOGGLES

S	.413" Bat
S2	.200" Bat
S3	.256" Bat
E	.450" Flatted
E2	.256" Flatted
E3	.646" Flatted
E4	.840" Flatted
F	.450" Flatted for Splashproof
Q	.550" Cone
Q2	.640" Cone
Q4	.840" Cone
M	.748" Column
C	.571" Color Tipped Cone
D	.840" Color Capped Cone
N	.748" Color Tipped Column
K1	.370" Paddle
K2	.559" Paddle

Toggle dimensions are based on use with .350" bushing; add .070" to toggle length when combining with a .280" bushing. Specify cap color for toggles C, D, N, K1 & K2 at the end of the part number.

L	.201" Dia. Locking Lever
L1	.214" Dia. Locking Lever

B	.453" Large Bat
B2	.689" Large Bat
R	.610" Large Flatted

BUSHINGS

1/4"-40 Dia. Threaded & .244 Dia. Smooth	
S1	.350" Threaded with Keyway
S2	.350" Smooth with Keyway
D1	.350" Threaded with D Flat
A1	.280" Threaded with Keyway
A2	.280" Smooth with Keyway
D3	.350" Threaded Splashproof with D Flat (combines only with S, S2, S3, and F toggles)
6mm Diameter Threaded	
S4	.350" Threaded with Keyway

1/4"-40 Dia. Threaded & .244" Dia. Smooth	
L1	Threaded with Keyway for Lever Lock
L2	Smooth with Keyway for Lever Lock
L3	.295" Threaded Splashproof with D Flat for Lever Lock

12mm Diameter Threaded	
B1	Large .472" Threaded with Keyway
B3	Large .472" Threaded Splashproof with D Flat

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SWITCH ORDERING EXAMPLE

W 01 — □ □

CONTACT MATERIALS & RATINGS	
W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125 AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

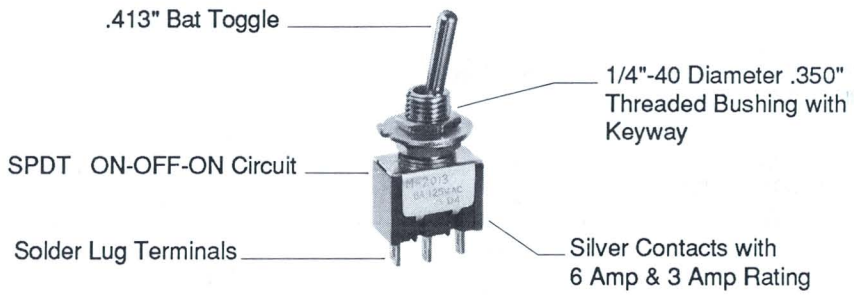
OPTIONAL CAPS	
B	For S Bat Toggle
C	Conical Cap for S Bat Toggle
R	For B Toggle
V	For B2 Toggle

CAP COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue

TERMINALS	
01	Solder Lug
02	Quick Connect
03	.250" Straight PC
05	.425" Wirewrap
06	.750" Wirewrap
07	.964" Wirewrap
08	1.062" Wirewrap

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2013SS1W01)

SERIES M TOGGLE



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

NKK SERIES M TOGGLE SWITCHES

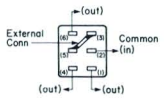
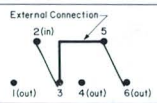
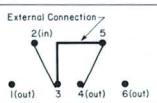
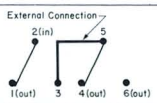
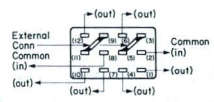
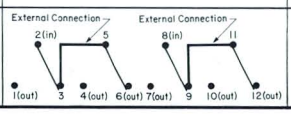
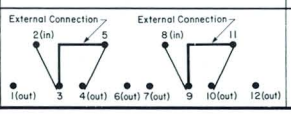
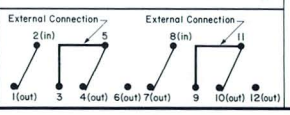
SUBMINIATURE/MULTI-FUNCTION/UNBRACKETED

POLES AND CIRCUITS

POLE & THROW	MODEL	TOGGLE POSITION & TERMINAL NUMBERS ( ) = Momentary — Down (Keyway)	Center	Up	SCHEMATICS
SPST	M2011	ON	NONE	OFF	
CONNECTED TERMINALS		2–3	OPEN	OPEN	
SPDT	M2012	ON	NONE	ON	
	M2013	ON	OFF	ON	
	M2015*	ON	NONE	(ON)	
	M2018	(ON)	OFF	(ON)	
	M2019*	ON	OFF	(ON)	
CONNECTED TERMINALS		2–3	OPEN	2–1	
DPST	M2021	ON	NONE	OFF	
CONNECTED TERMINALS		2–3 5–6	OPEN	OPEN	
DPDT	M2022	ON	NONE	ON	
	M2023	ON	OFF	ON	
	M2025*	ON	NONE	(ON)	
	M2028	(ON)	OFF	(ON)	
	M2029*	ON	OFF	(ON)	
CONNECTED TERMINALS		2–3 5–6	OPEN	2–1 5–4	
3PDT	M2032	ON	NONE	ON	
	M2033	ON	OFF	ON	
	M2035	ON	NONE	(ON)	
	M2038	(ON)	OFF	(ON)	
	M2039	ON	OFF	(ON)	
CONNECTED TERMINALS		2–3 5–6 8–9	OPEN	2–1 5–4 8–7	
4PDT	M2042	ON	NONE	ON	
	M2043	ON	OFF	ON	
	M2045	ON	NONE	(ON)	
	M2048	(ON)	OFF	(ON)	
	M2049	ON	OFF	(ON)	
CONNECTED TERMINALS		2–3 5–6 8–9 11–12	OPEN	2–1 5–4 8–7 11–10	

* Reverse circuits available upon request.

Terminal numbers are not actually on switches.

SP3T	M2024	ON	ON	ON	The SP3T model is a conversion of the DPDT.
	M2026	(ON)	ON	(ON)	
	M2027	ON	ON	(ON)	
CONNECTED TERMINALS W/O EXTERNAL CONNECTIONS		2–3 5–6	2–3 5–4	2–1 5–4	
SCHEMATIC WITH EXTERNAL CONNECTIONS					The DP3T model is a conversion of the 4PDT.
DP3T	M2044	ON	ON	ON	
	M2046	(ON)	ON	(ON)	
	M2047	ON	ON	(ON)	
CONNECTED TERMINALS W/O EXTERNAL CONNECTIONS		2–3 5–6 8–9 11–12	2–3 5–4 8–9 11–10	2–1 5–4 8–7 11–10	
SCHEMATIC WITH EXTERNAL CONNECTIONS					The external connections must be made during field installation.

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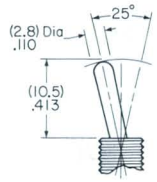
NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/UNBRACKETED

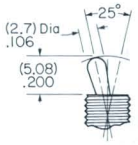
TOGGLES

All the toggles are brass with a standard finish of bright chrome; satin chrome and black finishes are available on request to the factory. Toggle dimensions are based on combination with the .350" bushing; add .070" to toggle length when combined with the .280" bushing.

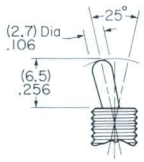
S .413" Bat



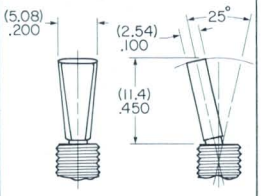
S2 .200" Bat



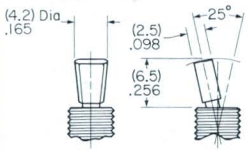
S3 .256" Bat



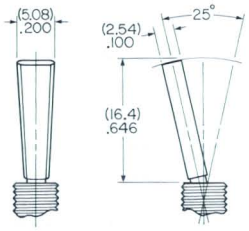
E .450" Flatted



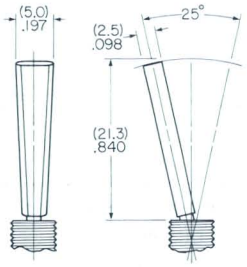
E2 .256" Flatted



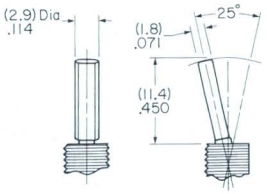
E3 .646" Flatted



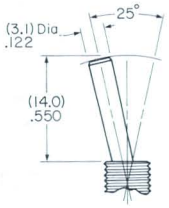
E4 .840" Flatted



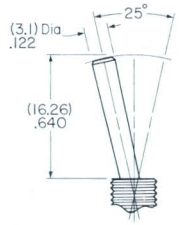
F .450" Flatted for Splashproof



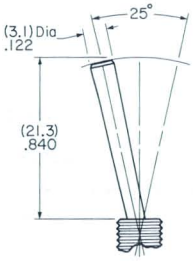
Q .550" Cone



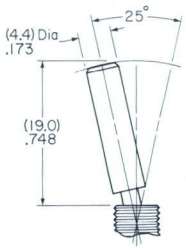
Q2 .640" Cone



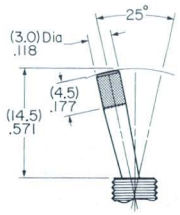
Q4 .840" Cone



M .748" Column

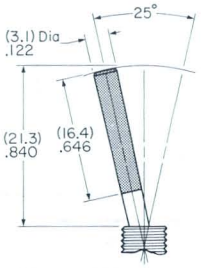


C .571" Color Tipped Cone



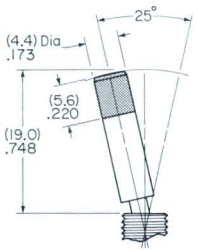
Supplied with CapAT445
Polycarbonate

D .840" Color Capped Cone



Supplied with Cap AT460
Polyethylene

N .748" Color Tipped Column

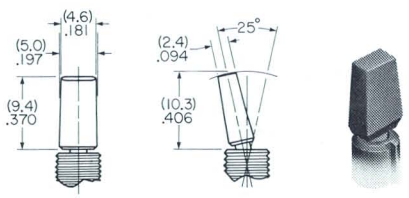


Supplied with Cap AT441
Polypropylene

K1

.370" Paddle

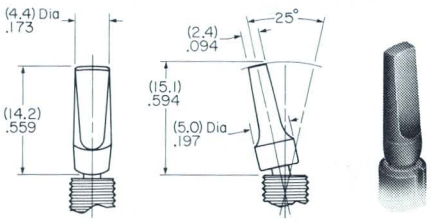
Supplied with Cap AT467
Nylon



K2

.559" Paddle

Supplied with Cap AT468
Nylon



Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue
(**H** Gray is also available for AT467 & AT468)

For toggles C, D, N, K1 & K2 the cap color code must be specified at the end of the part number.

NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/UNBRACKETED

TOGGLES

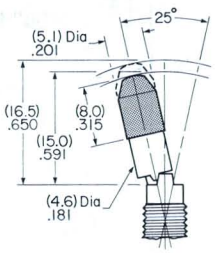
Locking toggles are brass with chrome plating, while the standard caps supplied with these toggles are nickel plated. A color code must be specified at the end of the part number to order the optional colored or brushed aluminum caps. Locking toggles can be combined only with L1, L2, and L3 bushings.

L **.201" Dia. Locking Lever**

Supplied with Cap AT427

Standard: Nickel Plated Brass

Optional: Colored or Brushed Aluminum

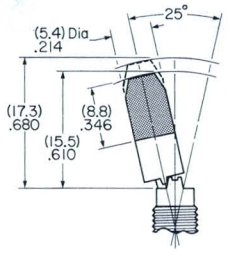


L1 **.214" Dia. Locking Lever**

Supplied with Cap AT076

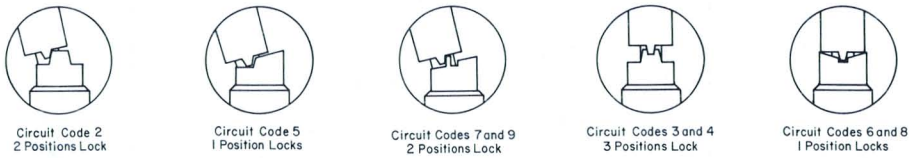
Standard: Nickel Plated Brass

Optional: Colored or Brushed Aluminum



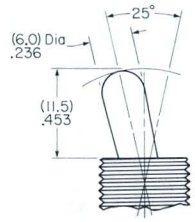
Colors & Finish for Optional Aluminum: **A** Black **C** Red **G** Blue **9** Brushed Aluminum

LOCKING MECHANISM

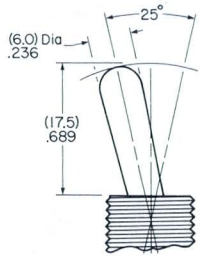


Large toggles are brass with a standard finish of bright chrome; satin chrome and black finishes are available on request to the factory. These large toggles can be combined only with 12mm bushings.

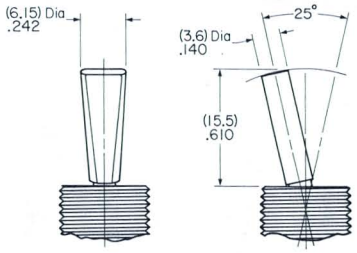
B **.453" Large Bat**



B2 **.689" Large Bat**



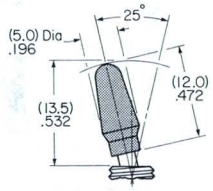
R **.610 Large Flatted**



OPTIONAL CAPS

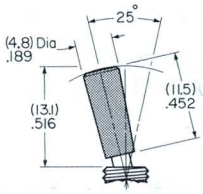
B **AT415 For S Bat Toggle**

Polyethylene



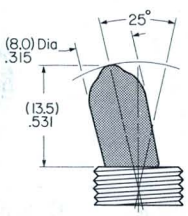
C **AT444 Conical Cap for S Bat Toggle**

Polyethylene



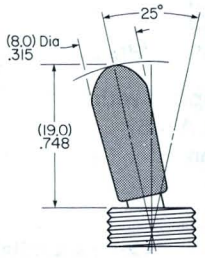
R **AT434 For B Toggle**

Vinyl Chloride



V **AT406 For B2 Toggle**

Vinyl Chloride



Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue

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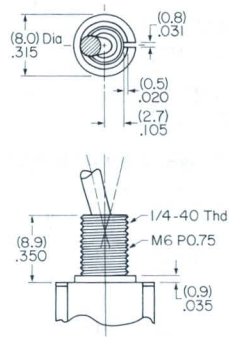
NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/UNBRACKETED

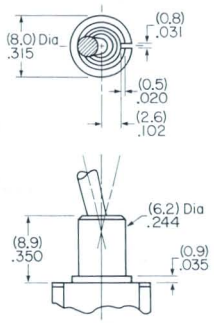
BUSHINGS

1/4"-40 Diameter & 6mm Threaded & .244" Diameter Smooth

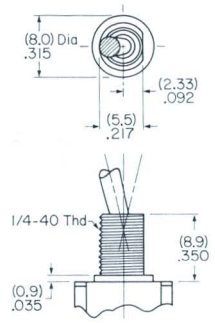
S1 .350" Threaded w/Keyway — 1/4"-40 — **S4** 6mm



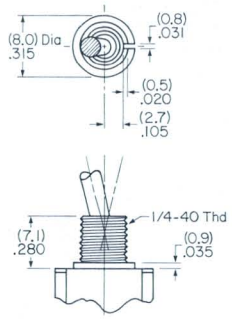
S2 .350" Smooth w/Keyway



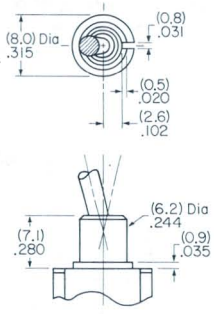
D1 .350" Threaded w/D Flat



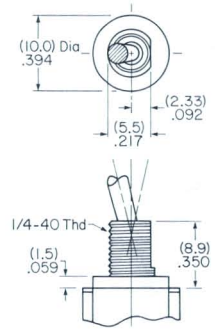
A1 .280" Threaded w/Keyway



A2 .280" Smooth w/Keyway

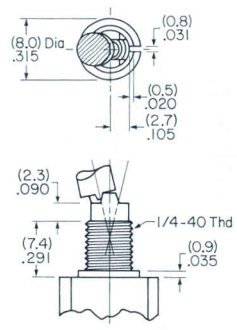


D3 .350" Threaded Splashproof w/D Flat

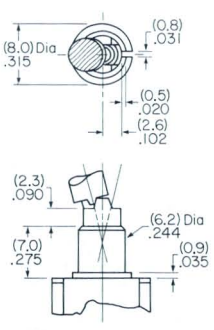


Combines only w/S, S2, S3, & F toggles.

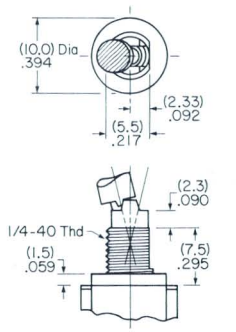
L1 Threaded w/Keyway for Lever Lock



L2 Smooth w/Keyway for Lever Lock

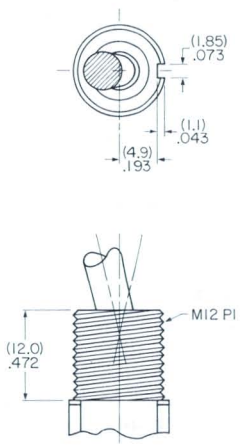


L3 .295" Threaded Splashproof w/D Flat for Lever Lock

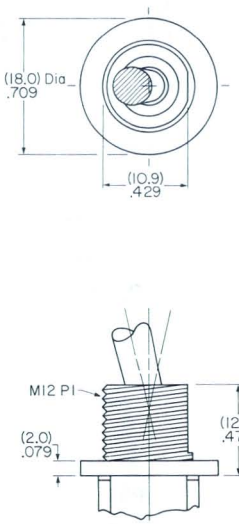


12mm Diameter Threaded

B1 Large .472" Threaded w/Keyway



B3 Large .472" Threaded Splash-proof w/D Flat



CONTACT MATERIALS & RATINGS

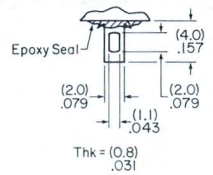
W Silver over Silver Rated 6A @ 125V AC & 3A @ 250V AC	**A** Gold over Silver Rated 6A @ 125V AC & 0.4VA maximum @ 28V maximum AC/DC	**G** Gold over Brass or Copper Rated 0.4VA maximum @ 28V maximum AC/DC

NKK SERIES M TOGGLE SWITCHES

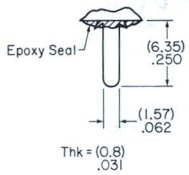
SUBMINIATURE/MULTI-FUNCTION/UNBRACKETED

TERMINALS & FOOTPRINTS

01 Solder Lug

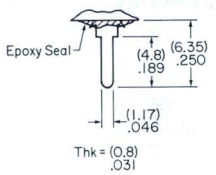


02 .062" Wide Quick Connect



Typical mating connector
AMP #60900-1

03 .250" Straight PC



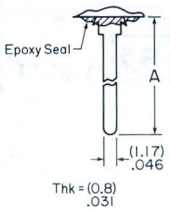
Wirewrap

05 .425" (10.8mm)

06 .750" (19.05mm)

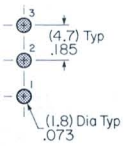
07 .964" (24.5mm)

08 1.062" (27.0mm)

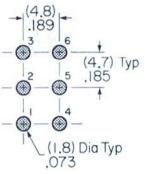


Dim. A = above terminal lengths.

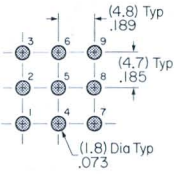
Single Pole



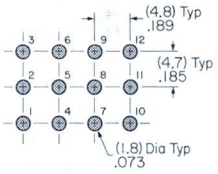
Double Pole



Three Pole



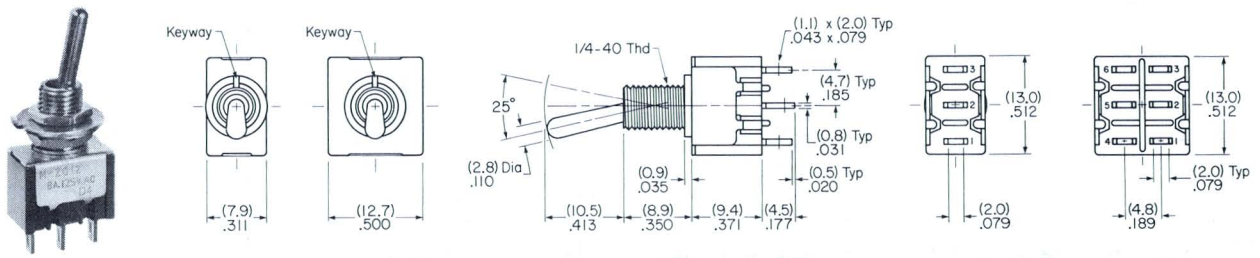
Four Pole



Soldering Time & Temperature Limits:
3 seconds at 350°C or
5 seconds at 270°C.

Wiring Specs:
Solder lug terminals have a
.043" X .079" oblong hole which accommodates
1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

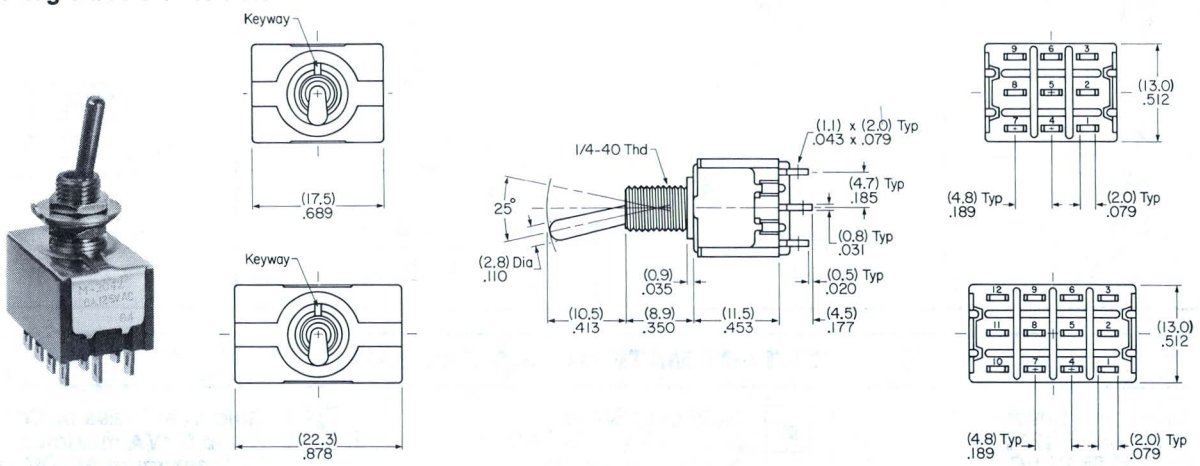
Solder Lug/Single & Double Pole



M2012SS1WO1 Model Shown

M2011 & M2021 models do not have terminals 1 & 4.

Solder Lug/Three & Four Pole



M2042SS1WO1 Model Shown

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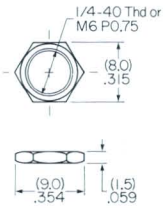
NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/UNBRACKETED

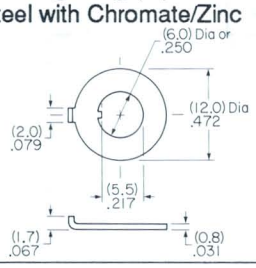
STANDARD HARDWARE

For 1/4"-40 & 6mm Diameter Bushings

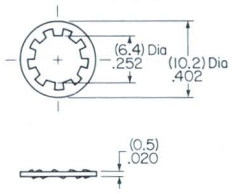
AT513H for Inch
AT513M for Metric
Hex Nut (2 per switch)
Nickel/Brass



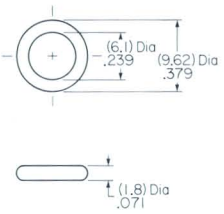
AT507H for Inch
AT507M for Metric
Locking Ring (1 per switch)
Steel with Chromate/Zinc



AT509
Lockwasher (1 per switch)
Steel with Chromate/Zinc

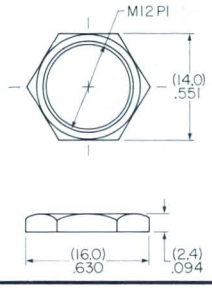


AT516
O-ring for Splashproof Models (1 per switch)
Nitrile Butadiene Rubber

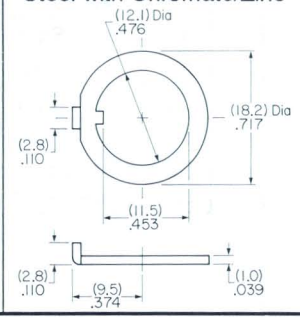


12mm Diameter Bushing

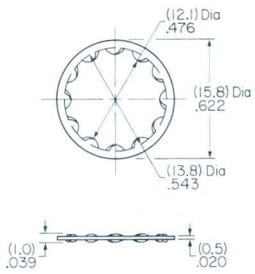
AT503M
Hex Face Nut
Chrome/Brass



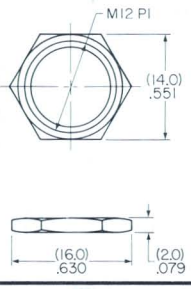
AT506M
Locking Ring
Steel with Chromate/Zinc



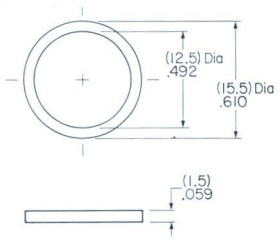
AT508
Lockwasher
Steel with Chromate/Zinc



AT527M
Hex Nut
Nickel/Steel



AT537
O-ring for Splashproof Models
Nitrile Butadiene Rubber

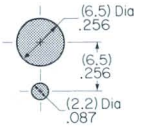
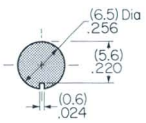
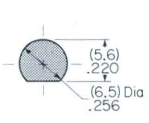


OPTIONAL HARDWARE & ACCESSORIES

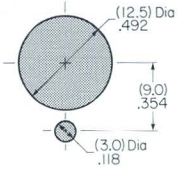
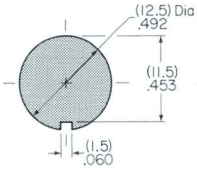
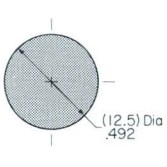
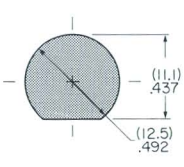
Various optional knurled or dress nuts and ON-OFF plates are available, as illustrated in the hardware & accessories sections.

MAXIMUM EFFECTIVE PANEL THICKNESS & CUTOUTS

For 1/4"-40 & 6mm Diameter Bushings

Threaded Length ▼ / Hardware ►		Standard	W/O Bottom Hex Nut	W/O Locking Ring	W/O L. Ring & Bottom Hex Nut	W/One Hex Nut & O-ring (Splashproof)
.315"	Panel Thickness:	2.6mm/.102"	4.7mm/.185"	3.4mm/.134"	5.5mm/.216"	4.9mm/.193"
.245"		0.8mm/.031"	2.9mm/.114"	1.6mm/.063"	3.7mm/.146"	Not Available
.221" Locking		1.2mm/.047"	3.2mm/.126"	2.0mm/.079"	4.0mm/.157"	3.5mm/.138"
	Cutout:					

For 12mm Diameter Bushing

.393"	Panel Thickness:	5.5mm/.216"	7.5mm/.295"	6.5mm/.256"	8.5mm/.335"	6.5mm/.256"
	Cutout:					

NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

TYPICAL STRAIGHT PC BRACKETED

M20 2 5 S S2

POLES	
1	SPDT
2	DPDT SP3T

TOGGLES	
S	.413" Bat
S2	.200" Bat
S3	.256" Bat
E	.450" Flatted
E2	.256" Flatted
E3	.646" Flatted
E4	.840" Flatted
Q	.550" Cone
Q2	.640" Cone
Q4	.840" Cone

Toggle dimensions are based on use with .350" bushing; add .070" to toggle length when combining with a .280" bushing.

BUSHINGS	
1/4"-40 Dia. Threaded & .244 Dia. Smooth	
A2	.280" Smooth with Keyway
A1	.280" Threaded with Keyway
S2	.350" Smooth with Keyway
S1	.350" Threaded with Keyway

Deduct bracket thickness of .016" from above dimensions.

CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
4*	ON	ON	ON
6*	(ON)	ON	(ON)
7*	ON	ON	(ON)

( ) = Momentary

*3-ON circuits available with double and four pole bases only.

L	.201" Dia. Locking Lever
L1	.214" Dia. Locking Lever

.244" Diameter Smooth	
L2	Smooth with Keyway for Lever Lock

Standard Toggle & Bushing Combinations

For straight PC bracketed switches, the standard toggle and bushing combinations are SS2, S2A2, S3S2, ES2, and LL2.

NKK switches • 7850 E. Gelding Dr. • Scottsdale, AZ 85260 • Phone (602) 991-0942 • Fax (602) 998-1435

SWITCH ORDERING EXAMPLE

G **13** — **B** **C**

CONTACT MATERIALS & RATINGS	
W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

OPTIONAL CAPS	
B	For S Bat Toggle
C	Conical Cap for S Bat Toggle

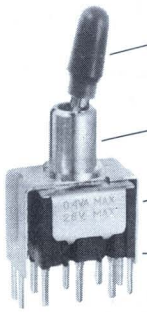
CAP COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue

TERMINALS	
With Bracket	
13	.250" Straight PC with .465" Bracket
15	.425" Straight PC with .630" Bracket
17	.964" Straight PC with 1.150" Bracket
With Reinforced Bracket	
23	.250" Straight PC with .465" Bracket
25	.425" Straight PC with .630" Bracket
26	.750" Straight PC with .953" Bracket

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2025SS2G13-BC)

SERIES M TOGGLE



Red Cap on .413" Bat Toggle

.350" Smooth Bushing with Keyway

Gold Contacts with 0.4VA Rating

DPDT
ON-NONE-(ON) Circuit

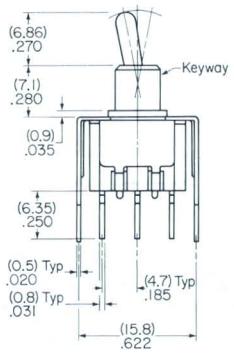
.250" Straight PC Terminals with Bracket .465" Long

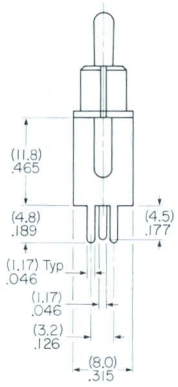
NKK SERIES M TOGGLE SWITCHES

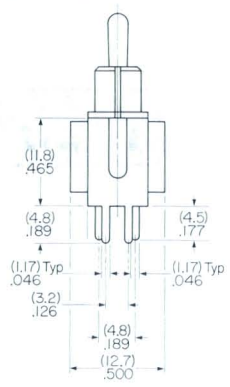
SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

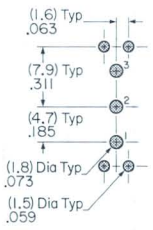
Straight PC with Bracket/Single & Double Pole

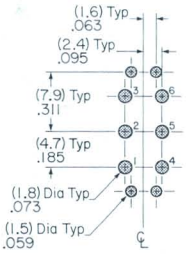
M2012S2A2G13 Model Shown







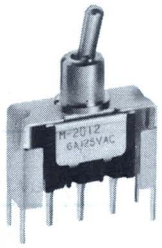




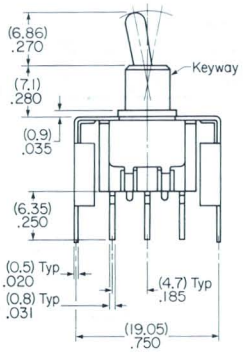
Terminal Code	Terminal Length	Bracket Length
13	.250" (6.4mm)	.465" (11.8mm)
15	.425" (10.8mm)	.630" (16.0mm)
17	.964" (25.5mm)	1.150" (29.2mm)

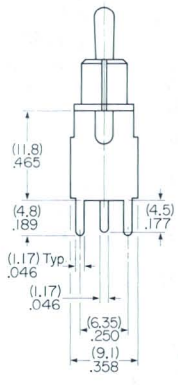
M2011 & M2021 models do not have terminals 1 & 4.

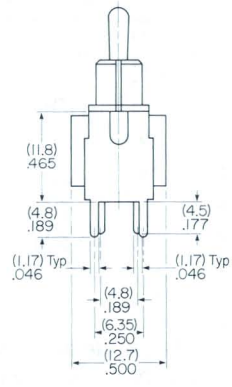
Straight PC with Reinforced Bracket/Single & Double Pole

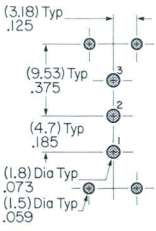


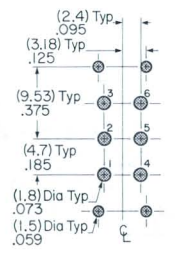
M2012S2A2G23 Model Shown











Terminal Code	Terminal Length	Bracket Length
23	.250" (6.4mm)	.465" (11.8mm)
25	.425" (10.8mm)	.630" (16.0mm)
26	.750" (19.05mm)	.953" (24.2mm)

M2011 & M2021 models do not have terminals 1 & 4.

NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/ANGLE PC MOUNT

TYPICAL ANGLE PC SWITCH

M20 1 2 S S2

POLES	
1	SPDT
2	DPDT SP3T
3	3PDT
4*	4PDT DP3T

* 4-pole available on vertical models only.

CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
4*	ON	ON	ON
6*	(ON)	ON	(ON)
7*	ON	ON	(ON)

( ) = Momentary

*3-ON circuits available with double and four pole bases only.

TOGGLES	
S	.413" Bat
S2	.200" Bat
S3	.256" Bat
E	.450" Flatted
E2	.256" Flatted
E3	.646" Flatted
E4	.840" Flatted
Q	.550" Cone
Q2	.640" Cone
Q4	.840" Cone

Toggle dimensions are based on use with .350" bushing; add .070" to toggle length when combining with a .280" bushing.

BUSHINGS	
1/4"-40 Dia. Threaded & .244 Dia. Smooth	
A2	.280" Smooth with Keyway
A1	.280" Threaded with Keyway
S2	.350" Smooth with Keyway
S1	.350" Threaded with Keyway
D1	.350" Threaded with D Flat

Deduct bracket thickness of .016" from above dimensions.

L	.201" Dia. Locking Lever
L1	.214" Dia. Locking Lever

.244" Dia. Smooth	
L2	Smooth with Keyway for Lever Lock

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

Standard Combinations

For angle PC mounted switches, the standard toggle-bushing-terminal combinations are S2A2G30, S2A2G40, SS2G30, SS2G40, LL2G30, and LL2G40.

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ORDERING EXAMPLE

G **40** — **B** **A**

CONTACT MATERIALS & RATINGS	
W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

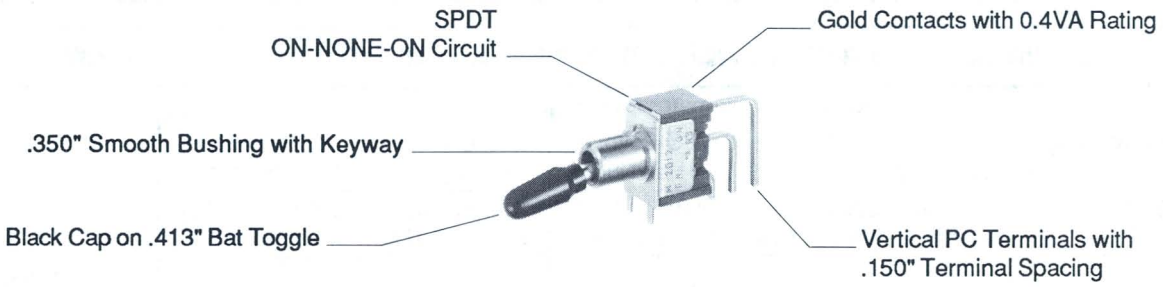
OPTIONAL CAPS	
B	For S Bat Toggle
C	Conical Cap for S Bat Toggle

CAP COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue

TERMINALS	
30	.150" Right Angle PC (1-3 Pole)
32	Right Angle PCB (1 Pole & 0.4VA Rating Only)
40	.150" Vertical PC (1-4 Pole)
45	.100" Vertical PC (1-4 Pole)

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2012SS2G40-BA)

SERIES M TOGGLE



NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/ANGLE PC MOUNT

POLES, CIRCUITS, TOGGLES, BUSHINGS & CAPS

Details regarding the poles and circuits are given in a chart in the unbracketed section. That same section also contains detailed information for the toggles, caps, and bushings. For bushing lengths on these bracketed models deduct .016" from the dimensions given in the previous detail drawings.

Details regarding the contact materials and ratings, terminals, mounting information, and full switch drawings specific to angle mount devices are in this section.

CONTACT MATERIALS & RATINGS

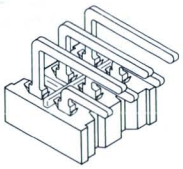
W Silver over Silver Rated 6A @ 125V AC & 3A @ 250V AC

A Gold over Silver Rated 6A @ 125V AC & 0.4VA maximum @ 28V AC/DC maximum

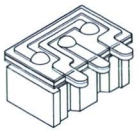
G Gold Rated 0.4VA maximum @ 28V AC/DC maximum

TERMINALS & FOOTPRINTS

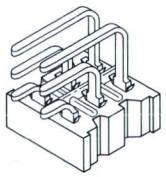
30 .150" Right Angle PC (1-3 Pole)



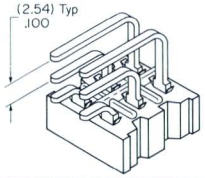
32 Right Angle PCB with Reverse Circuit (1 Pole & 0.4VA Rating Only)



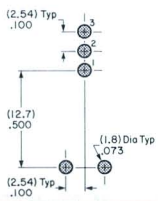
40 .150" Vertical PC (1-4 Pole)



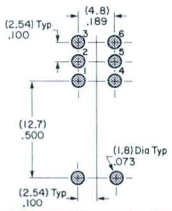
45 .100" Vertical PC (1-4 Pole)



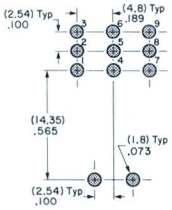
Single Pole



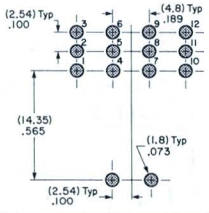
Double Pole



Three Pole



Four Pole

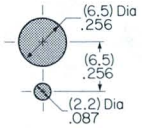
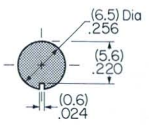
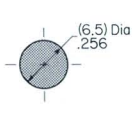


THREADED BUSHING MOUNT

If a threaded bushing is selected, the switch can be mounted in a panel cutout with the standard hardware provided: AT513, AT507, and AT509. The maximum effective panel thickness and cutouts are shown below. Detailed illustrations of the optional hardware and accessories appear at the end of the catalog.

MAXIMUM EFFECTIVE PANEL THICKNESS & CUTOUTS

For 1/4"-40 Diameter Bushings

Threaded Length ▼ / Hardware ►		Standard	W/O Bottom Hex Nut	W/O Locking Ring	W/O L. Ring & Bottom Nut
.315" / .245"	Panel Thickness:	3.3mm/.130" / 1.9mm/.076"	4.8mm/.189" / 3.43mm/.135"	4.1mm/.161" / 2.7mm/.107"	5.6mm/.220" / 4.2mm/.166"
	Cutout:				

SOLDERING LIMITS

3 seconds at 350°C

5 seconds at 270°C.

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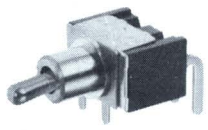
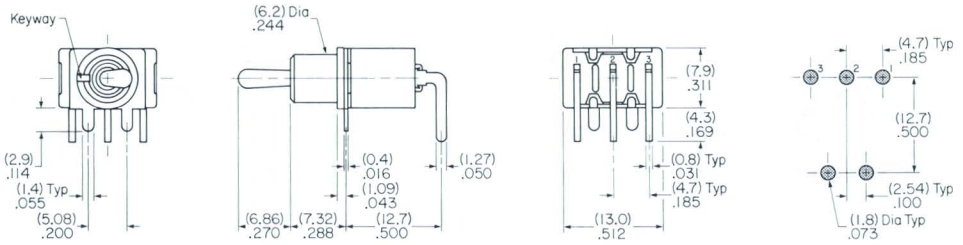
NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/ANGLE PC MOUNT

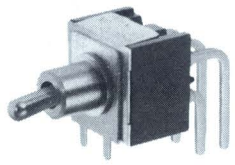
.150" Right Angle PC/Single Pole

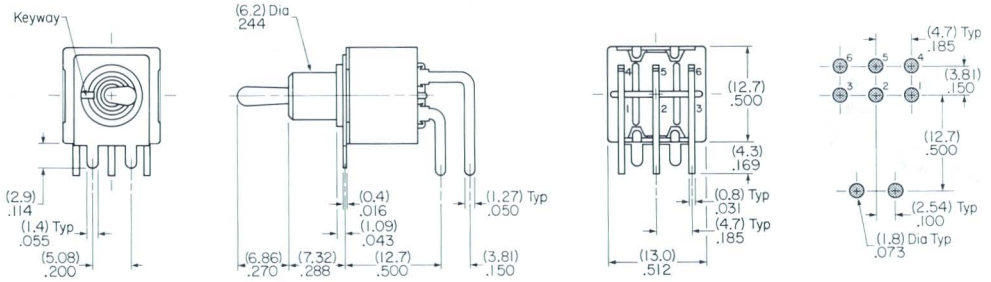




M2012S2A2G30 Model Shown

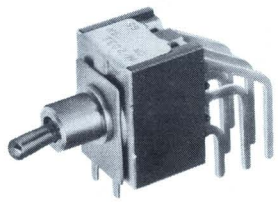
.150" Right Angle PC/Double Pole

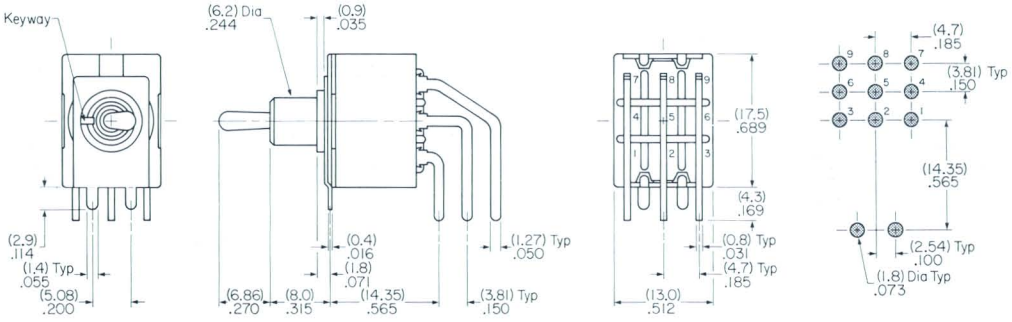




M2022S2A2G30 Model Shown

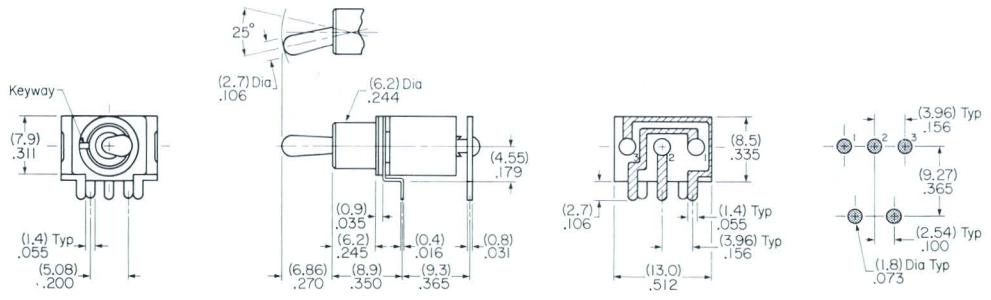
.150" Right Angle PC/Three Pole





M2032S2A2G30 Model Shown

PCB/Single Pole

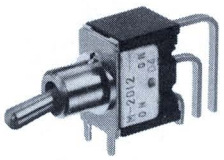


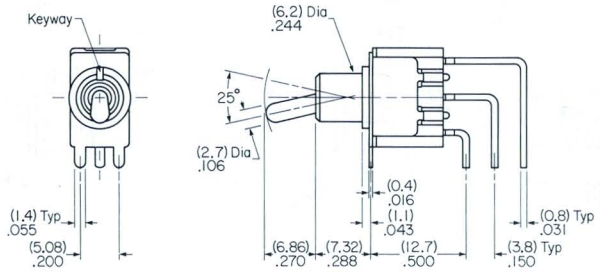
M2012S2A2G32 Model Shown

NKK SERIES M TOGGLE SWITCHES

SUBMINIATURE/MULTI-FUNCTION/ANGLE PC MOUNT

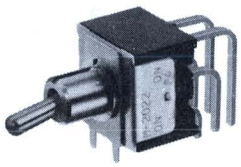
.150" Vertical PC/Single Pole

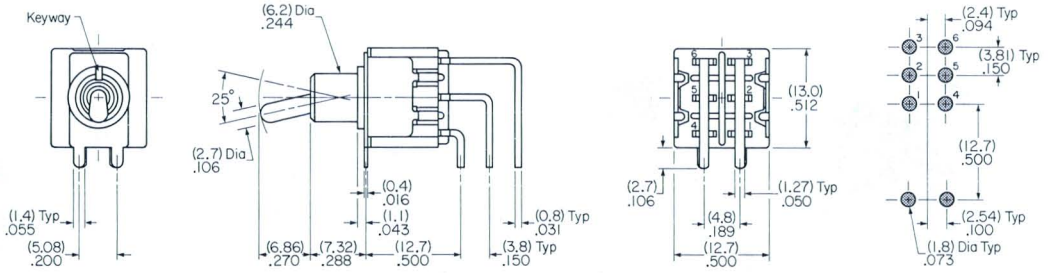




M2012S2A2G40 Model Shown

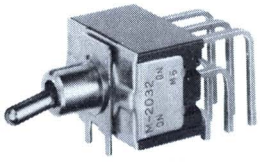
.150" Vertical PC/Double Pole

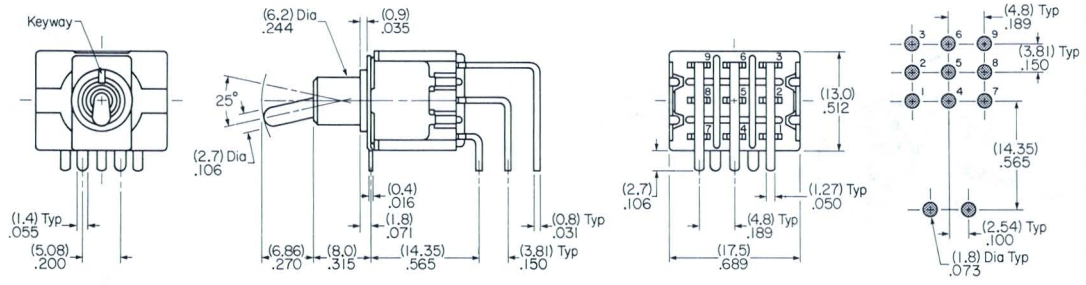




M2022S2A2G40 Model Shown

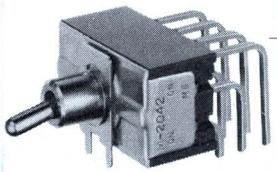
.150" Vertical PC/Three Pole

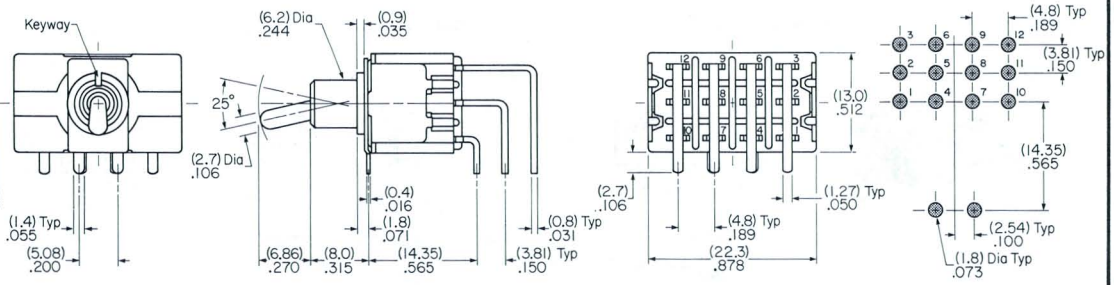




M2032S2A2G40 Model Shown

.150" Vertical PC/Four Pole





M2042S2A2G40 Model Shown

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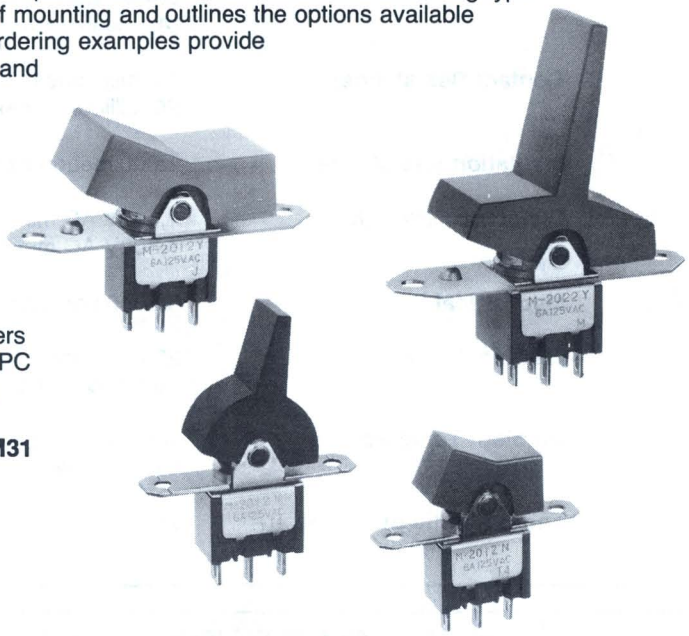
NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION

M SERIES ROCKERS

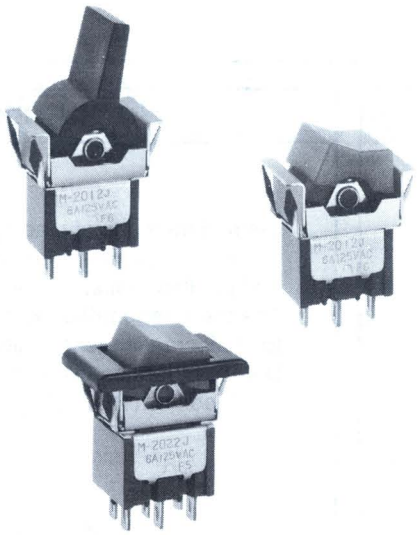
The rocker section is divided into subsections to reflect the three different mountings shown. There are two distinct sizes of rockers and paddles and a variety of terminal options which combine with each mounting type. A Typical Ordering Example is given for each type of mounting and outlines the options available for that particular mounting. Detail pages following ordering examples provide additional information regarding the options outlined and accessories available.



Flat Frame Mount (Codes TN & TY)

Flat frame devices are available in two sizes which accommodate either small or large rockers or paddles. Solder lug, quick connect, straight PC and wirewrap terminals may be combined with either of these frames.

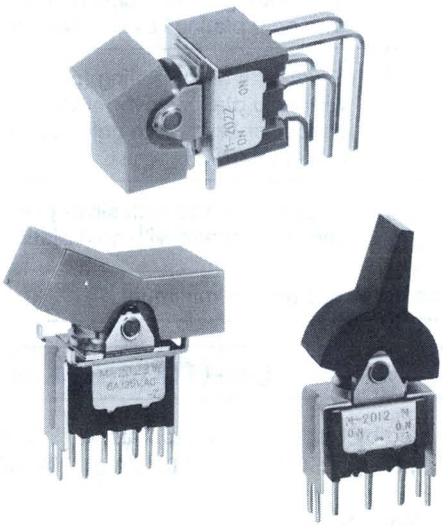
Pages M23 - M31



Snap-in Mount (Code TJ)

Snap-in frames accept the .453" wide rocker or paddle or the false illuminated rocker. Solder lug, quick connect, straight PC or wirewrap terminal options are available. An optional bezel with or without LED is offered.

Pages M32 - M41



Bracketed & Angle PC Mount (Codes TX & TZ)

In the bracketed PC mount subsection, separate ordering examples are given for small and large actuators. Small rockers and paddles may be combined with straight, right angle or vertical PC terminals. The large rocker or paddle may be combined with straight PC terminals only.

Pages M42 - M50

NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION

GENERAL SPECIFICATIONS

Electrical Capacity: **(Resistive Load)**	6A @ 125V AC & 3A @ 250V AC 6A @ 30V DC 0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	10 milliohms maximum for silver 20 milliohms maximum for gold
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	50,000 operations minimum
Electrical Life:	25,000 operations minimum for silver 50,000 operations minimum for gold
Ambient Temp Range:	-15°C through +85°C (+5°F through +185°F) Optional low temperature lubricant available
Toggle Angle of Throw:	25°

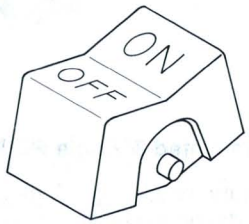
MATERIALS & FINISHES

Actuator Clip	Beryllium alloy with nickel plating
Mounting Frame	Stainless steel
Frame	Stainless steel
Case	Diallylphthalate resin
Movable Contactor	Phosphor bronze with silver or gold plating*
Movable Contacts	Silver alloy (code W); or silver alloy with gold plating* over nickel (code A); or copper with gold plating* over nickel (code G)
Stationary Contacts	Silver with silver plating (code W); or silver with gold plating* over nickel (code A); or copper or brass with gold plating* over nickel (code G)
Terminals	Copper or brass with silver plating; or copper or brass with gold plating over nickel

* Gold plating on contacts is 1 micron minimum.

LEGENDS

Several methods of placing legends on the face of the rocker are available: pad printing, hot stamping and engraving. The preferred method is pad printing due to the increased legend life obtained. Details regarding these methods may be obtained from the factory.



UL RECOGNITION & CSA CERTIFICATION

Models recognized by Underwriters Laboratories Inc. and certified by Canadian Standards Association at ratings of 6A @ 125V AC, 3A @ 250V AC, and 0.4VA @ 28V AC/DC are listed in the Supplement at the back of this catalog.

UL File No. E44145

CSA File Nos. LR23535 and LR56017

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NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/FLAT FRAME MOUNT

TYPICAL FLAT FRAME SWITCH ORDERING EXAMPLE

M20 1 2 TN W 01 — D C

POLES	
1	SPDT
2	DPDT SP3T
3	3PDT
4	4PDT DP3T

ACTUATOR/ MOUNTING FRAMES	
TN	.272" Wide Flat Frame
TY	.504" Wide Flat Frame

CONTACT MATERIALS & RATINGS	
W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

ROCKERS & PADDLES	
For TN Frame:	
D	.365″ Wide Rocker
E	.365″ Wide Paddle
F	.453″ Wide Rocker
G	.453″ Wide Paddle
S	.465″ False Illuminated Rocker in black only
K	.476″ Wide Paddle
For TY Frame:	
J	.598″ Wide Rocker
H	.598″ Wide Paddle

CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
4*	ON	ON	ON
6*	(ON)	ON	(ON)
7*	ON	ON	(ON)

( ) = Momentary

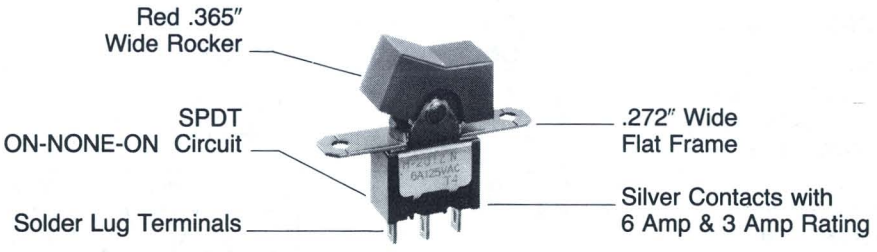
*3-ON circuits available in double pole & four pole bases only

TERMINALS	
01	Solder Lug
02	Quick Connect
03	.250″ Straight PC
05	.425″ Wirewrap
06	.750″ Wirewrap
07	.964″ Wirewrap
08	1.062″ Wirewrap

ROCKER & PADDLE COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2012TNW01-DC):

SERIES M ROCKER

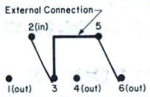
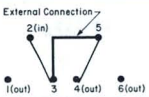
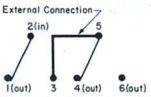
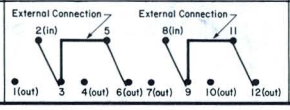
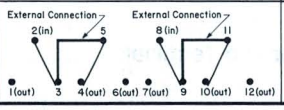
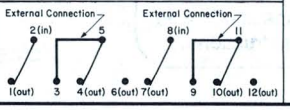


IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

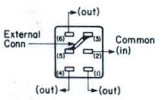
NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/FLAT FRAME MOUNT

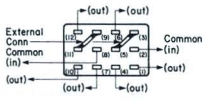
POLES AND CIRCUITS

POLE & THROW	MODEL	ROCKER POSITION & TERMINAL NUMBERS ( ) = Momentary Down	Center	Up	SCHEMATICS
		Rating Markings on Opposite Side			
SPDT	M2012 M2013 M2015* M2018 M2019*	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	
CONNECTED TERMINALS		2–3	OPEN	2–1	
DPDT	M2022 M2023 M2025* M2028 M2029*	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	
CONNECTED TERMINALS		2–3 5–6	OPEN	2–1 5–4	
3PDT	M2032 M2033 M2035 M2038 M2039	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	
CONNECTED TERMINALS		2–3 5–6 8–9	OPEN	2–1 5–4 8–7	
4PDT	M2042 M2043 M2045 M2048 M2049	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	
CONNECTED TERMINALS		2–3 5–6 8–9 11–12	OPEN	2–1 5–4 8–7 11–10	
*Reverse circuits available upon request. Terminal numbers are not actually on the switch.					
SP3T	M2024 M2026 M2027	ON (ON) ON	ON ON ON	ON (ON) (ON)	
CONNECTED TERMINALS W/O EXTERNAL CONNECTIONS		2–3 5–6	2–3 5–4	2–1 5–4	
SCHEMATIC WITH EXTERNAL CONNECTIONS					
DP3T	M2044 M2046 M2047	ON (ON) ON	ON ON ON	ON (ON) (ON)	
CONNECTED TERMINALS W/O EXTERNAL CONNECTIONS		2–3 5–6 8–9 11–12	2–3 5–4 8–9 11–10	2–1 5–4 8–7 11–10	
SCHEMATIC WITH EXTERNAL CONNECTIONS					

The SP3T model is a conversion of the DPDT.



The DP3T model is a conversion of the 4PDT.



The external connections must be made during field installation.

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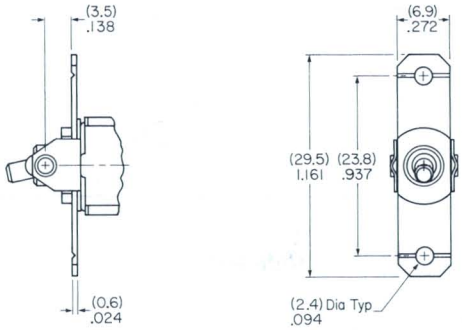
NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/FLAT FRAME MOUNT

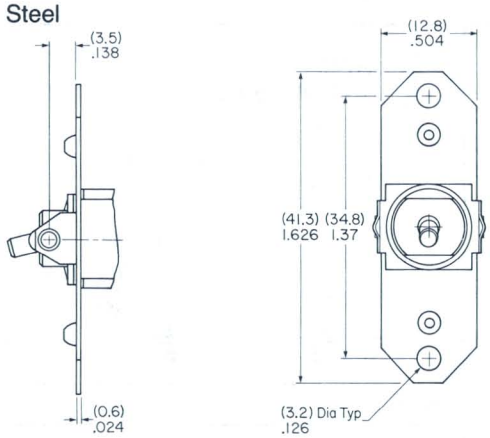
ACTUATOR/MOUNTING FRAMES

TN **.272″ Wide Flat Frame**
Stainless Steel



Used with Rockers AT4148, AT4150 and AT466
or Paddles AT4149, AT4151 and AT461

TY **.504" Wide Flat Frame**
Stainless Steel



Used with Rocker AT4156 or Paddle AT4157

CONTACT MATERIALS & RATINGS

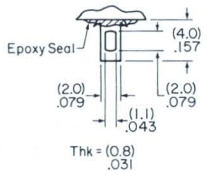
W **Silver over Silver**
Rated 6A @ 125V AC & 3A @ 250V AC

A **Gold over Silver**
Rated 6A @ 125V AC & 0.4VA maximum @ 28V AC/DC maximum

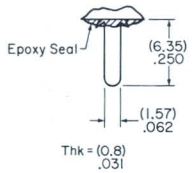
G **Gold over Brass or Copper**
Rated 0.4VA maximum @ 28V AC/DC maximum

TERMINALS

01 **Solder Lug**

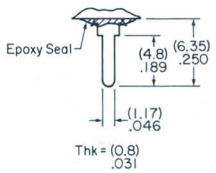


02 **.062″ Wide Quick Connect**



Corresponds to AMP #60900-1 receptacle

03 **.250″ Straight PC**



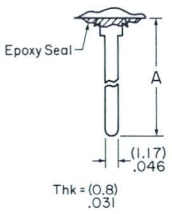
Wirewrap

05 **.425″ (10.8mm)**

06 **.750″ (19.05mm)**

07 **.964″ (24.5mm)**

08 **1.062″ (27.0mm)**



Dimension A = wirewrap terminal lengths as shown beside code boxes.

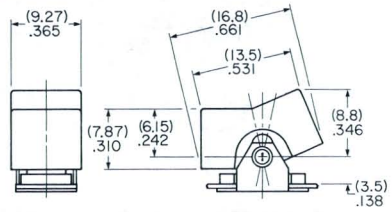
NKK SERIES M ROCKER SWITCHES

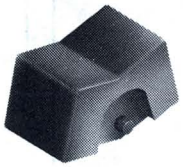
SUBMINIATURE/MULTI-FUNCTION/FLAT FRAME MOUNT

ROCKERS & PADDLES

For TN Frame

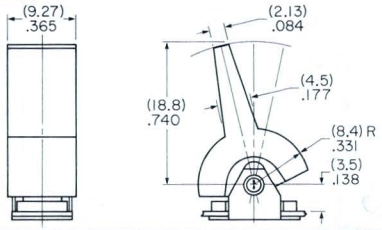
D **AT4148**
.365" Wide Rocker





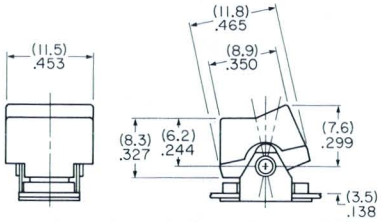
Nylon

E **AT4149**
.365" Wide Paddle



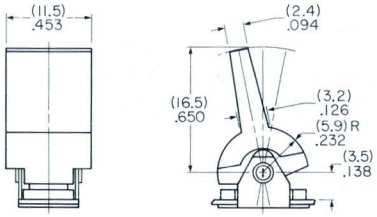
Nylon

F **AT4150**
.453" Wide Rocker



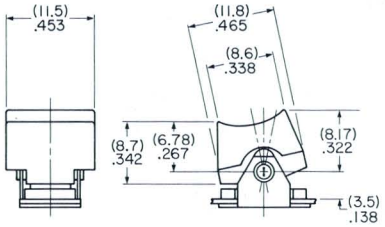
Nylon

G **AT4151**
.453" Wide Paddle



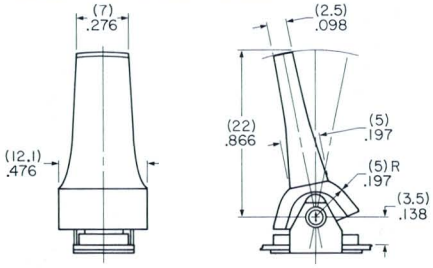
Nylon

S **AT466**
.453" False Illuminated Rocker



Cap is black with red and white false illuminator. Polycarbonate and Acrylonitrile Butadiene Styrene

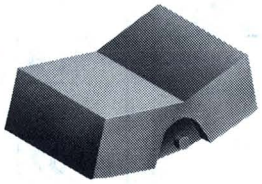
K **AT461**
.476" Wide Paddle



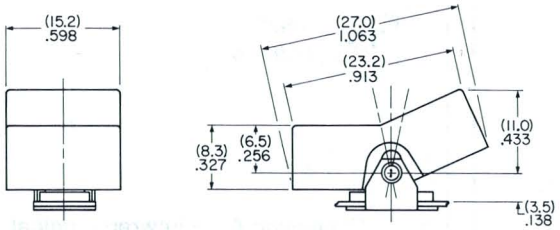
Polycarbonate

For TY Frame

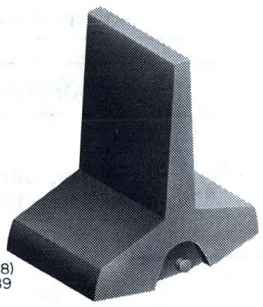
J **AT4156**
.598" Wide Rocker



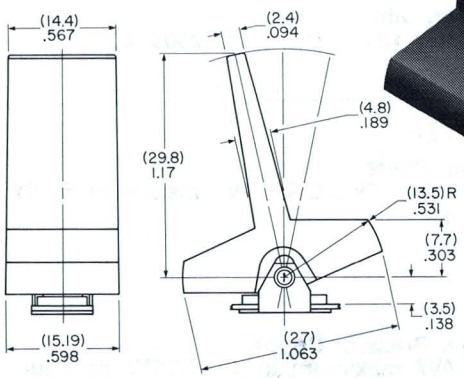
Nylon



H **AT4157**
.598" Wide Paddle



Nylon



Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

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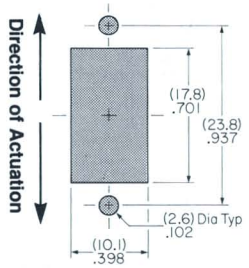
SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/FLAT FRAME MOUNT

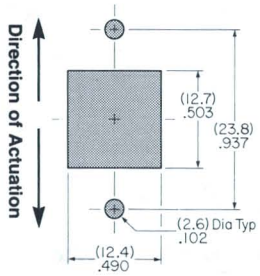
PANEL CUTOUTS

For TN Frame

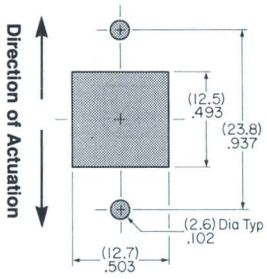
With AT4148 & AT4149



With AT4150, AT4151 & AT466

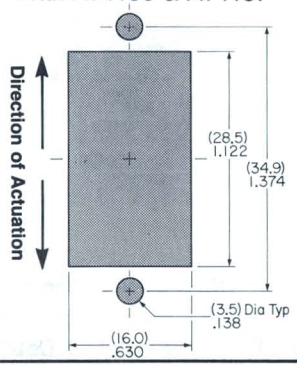


With AT461



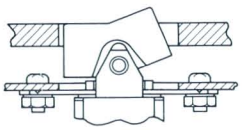
For TY Frame

With AT4156 & AT4157

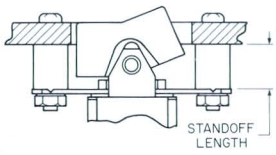


PANEL MOUNTING

These devices are especially designed for subpanel mounting. When installed on a mounting plate behind the panel, hardware is completely concealed and the front panel retains a clean, attractive appearance. Mounting hardware is not provided. Optional panel mounting frames are available and are shown in the bracketed PC mounting section.



Flat frame devices may also be mounted to the face panel. Standoffs are used to recess the actuator and achieve an attractive front panel appearance. Optional hardware kits may be ordered from the table given below.



HARDWARE KITS

Frame	Panel Thickness	Standoff Length	Hardware Kit Number
TN Frame	.125″	.233″	HK-1
TY Frame	.125″	.312″	HK-2

Hardware kits include: 2 each stainless steel screws, nuts and lockwashers and 2 aluminum or nylon standoffs.

SOLDERING LIMITS & WIRING SPECS

Soldering:

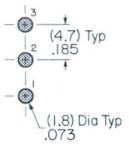
3 seconds at 350°C 5 seconds at 270°C

Wiring:

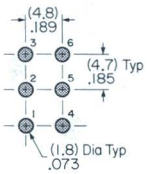
Solder lug terminals have a .043″ X .079″ oblong hole which accommodates 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

PC BOARD MOUNTING

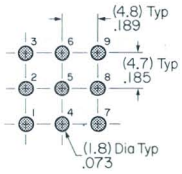
Single Pole



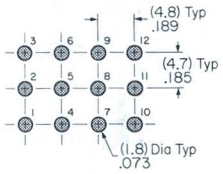
Double Pole



Three Pole



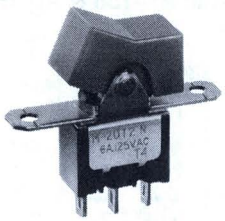
Four Pole



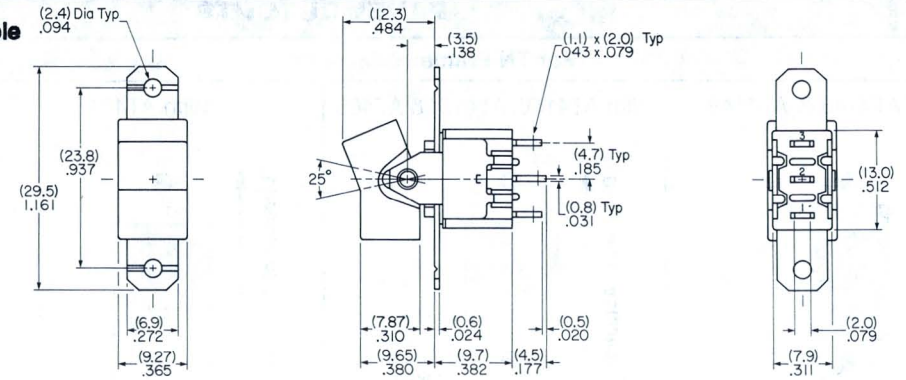
NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/FLAT FRAME MOUNT

TN Frame/Solder Lug/Single Pole

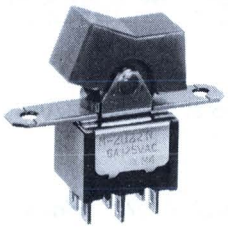


M2012TNW01-DC Model Shown

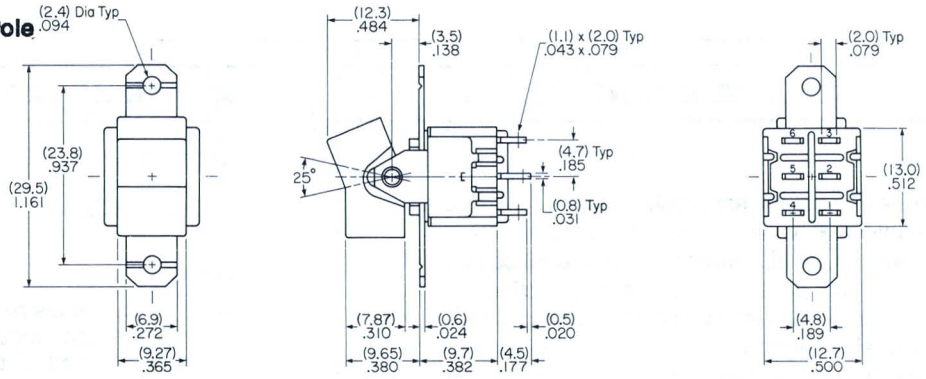


Actuator in DOWN position.

TN Frame/Solder Lug/Double Pole

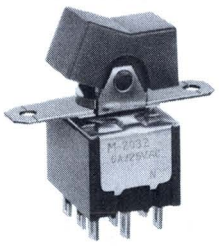


M2022TNW01-DC Model Shown

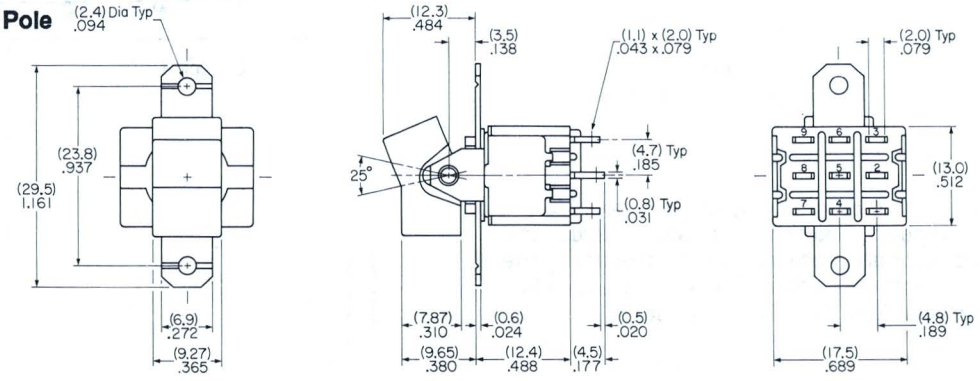


Actuator in DOWN position.

TN Frame/Solder Lug/Three Pole

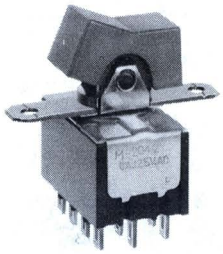


M2032TNW01-DC Model Shown

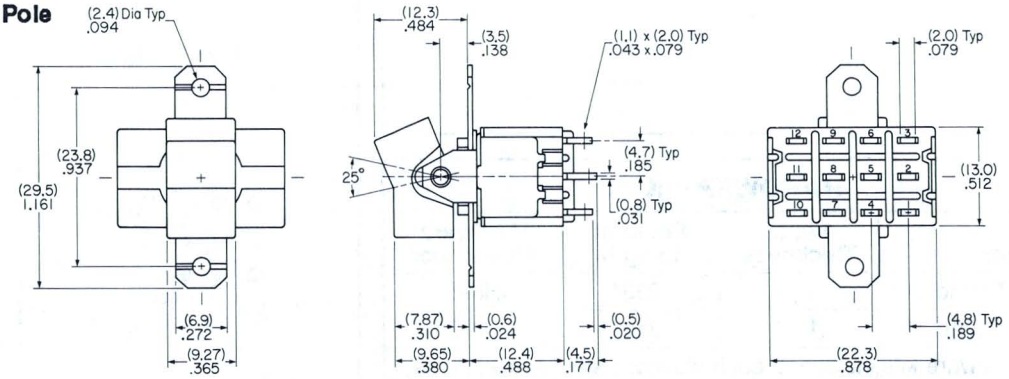


Actuator in DOWN position.

TN Frame/Solder Lug/Four Pole



M2042TNW01-DC Model Shown



Actuator in DOWN position.

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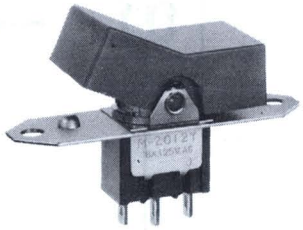
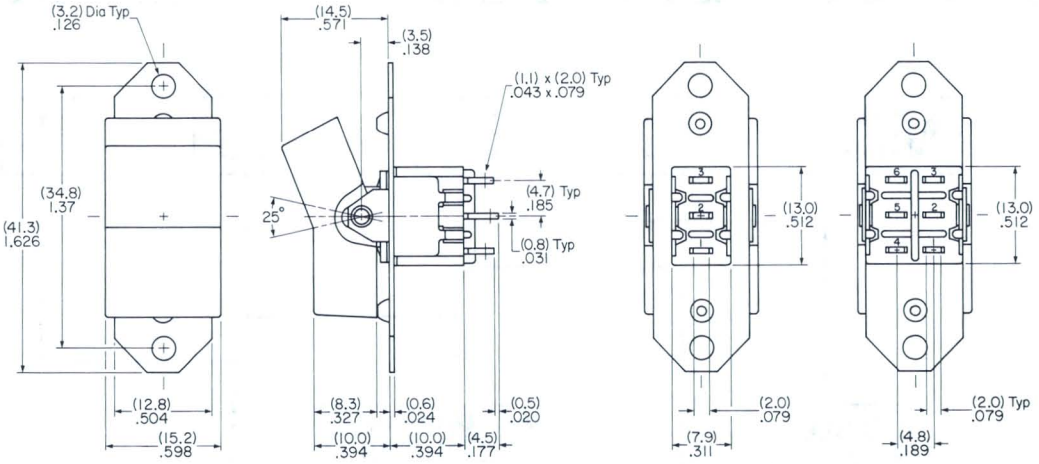
NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/FLAT FRAME MOUNT

TY Frame/Solder Lug/Single & Double Pole

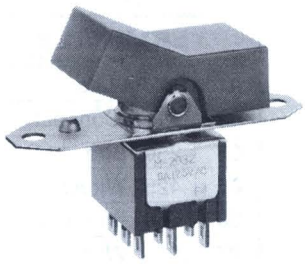


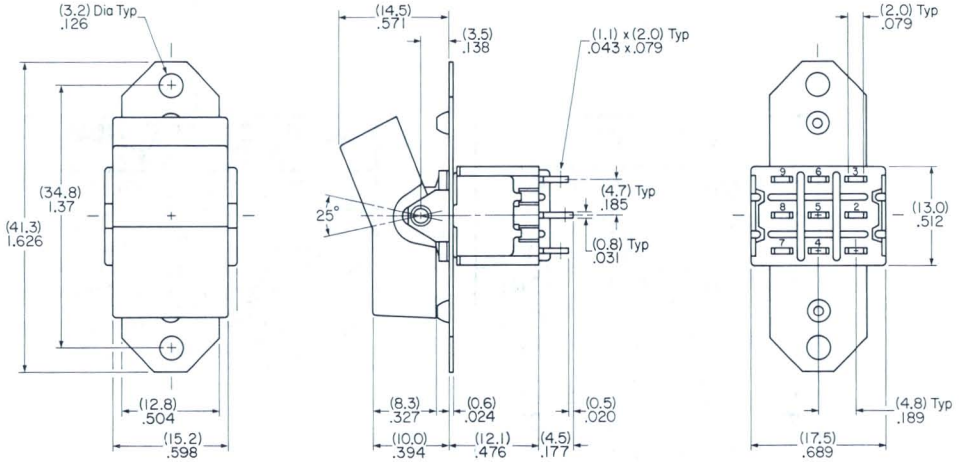


M2012TYW01-JC Model Shown

Actuator in DOWN position.

TY Frame/Solder Lug/Three Pole

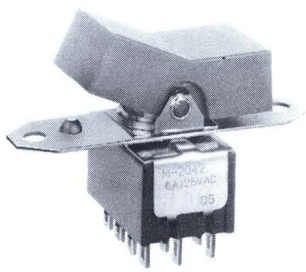


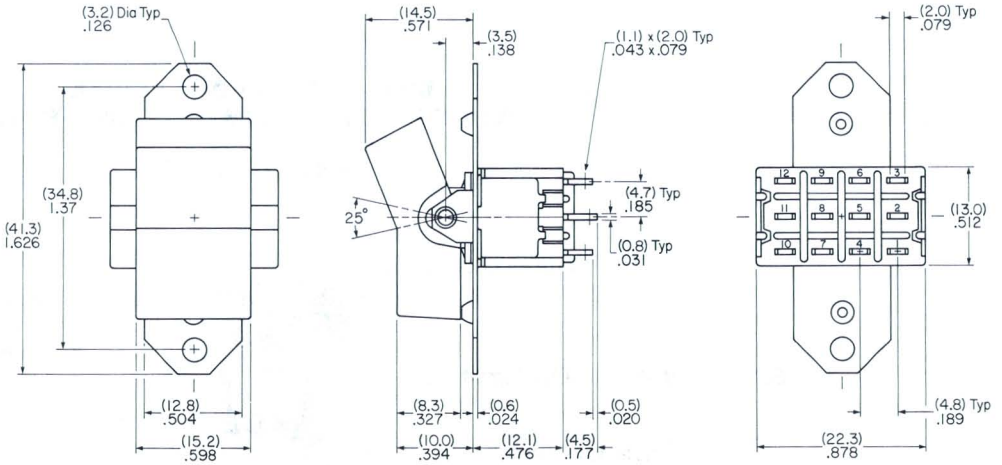


M2032TYW01-JC Model Shown

Actuator in DOWN position.

TY Frame/Solder Lug/Four Pole





M2042TYW01-JC Model Shown

Actuator in DOWN position.

NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/SNAP-IN MOUNT

TYPICAL SNAP-IN FRAME

M20 1 2 TJ W 01 —

POLES	
1	SPDT
2	DPDT SP3T

ACTUATOR/ MOUNTING FRAME	
TJ	Snap-in Frame

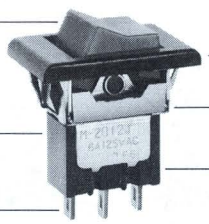
CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
4*	ON	ON	ON
6*	(ON)	ON	(ON)
7*	ON	ON	(ON)
( ) = Momentary			
* 3-ON circuits available with double pole base only.			

CONTACT MATERIALS & RATINGS	
W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

TERMINALS	
01	Solder Lug
02	Quick Connect
03	.250" Straight PC
05	.425" Wirewrap
06	.750" Wirewrap
07	.964" Wirewrap
08	1.062" Wirewrap

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2012TJW01-FC-1A):

SERIES M ROCKER



Red .453" Wide Rocker

SPDT ON-NONE-ON Circuit

Solder Lug Terminals

Black Bezel without LED

Snap-in Frame

Silver Contacts with 6 Amp & 3 Amp Rating

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SWITCH ORDERING EXAMPLE

ROCKERS & PADDLE	
F	.453" Wide Rocker
G	.453" Wide Paddle
S	.465" False Illuminated Rocker in black only

ROCKER & PADDLE COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

BEZEL COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray
Bezels with LEDs available in black only (code A)	

LED COLORS	
C	Red
CF	Red/Green
CE	Red/Yellow
CC	Red/Red
FE	Green/Yellow
FF	Green/Green
EE	Yellow/Yellow

OPTIONAL BEZELS	
1	Bezel without LED
2	Bezel with Single LED
3	Bezel with 2 Round LEDs
4	Bezel with 2 Rectangular LEDs

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/SNAP-IN MOUNT

POLES & CIRCUITS

For poles and circuit information, refer to the details contained in the Poles & Circuits Chart appearing in the previous flat frame section.

CONTACT MATERIALS & RATINGS

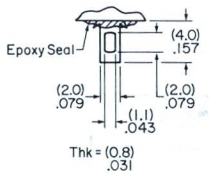
W **Silver over Silver**
Rated 6A @ 125V AC & 3A @ 250V AC

A **Gold over Silver**
Rated 6A @ 125V AC & 0.4VA maximum @ 28V AC/DC maximum

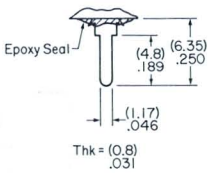
G **Gold over Brass or Copper**
Rated 0.4VA maximum @ 28V AC/DC maximum

TERMINALS

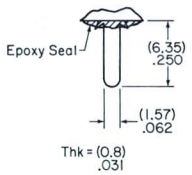
01 **Solder Lug**



03 **.250″ Straight PC**



02 **.062″ Wide Quick Connect**



Corresponds to AMP #60900-1 receptacle

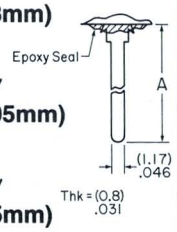
Wirewrap

05 **.425″ (10.8mm)**

06 **.750″ (19.05mm)**

07 **.964″ (24.5mm)**

08 **1.062″ (27.0mm)**

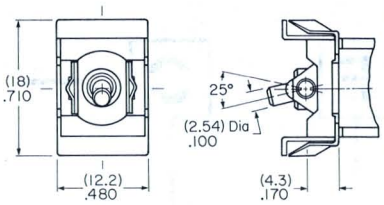


Dim. A represents above terminal lengths

ACTUATOR/MOUNTING FRAME

TJ **Snap-in Frame**

Stainless Steel



ROCKERS & PADDLE

F **AT4150**
.453″ Wide Rocker

Nylon

G **AT4151**
.453″ Wide Paddle

Nylon

S **AT466**
.465″ False Illuminated Rocker

Polycarbonate and Acrylonitrile Butadiene Styrene

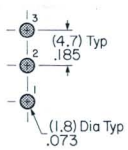
Black rocker with white & red false illuminator

Dimension drawings of rockers and paddle appear in the previous flat frame section.

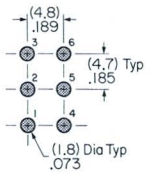
Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

PC BOARD MOUNTING

Single Pole



Double Pole



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NKK SERIES M ROCKER SWITCHES

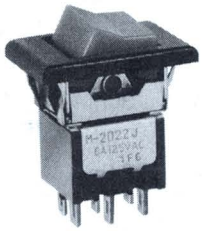
SUBMINIATURE/MULTI-FUNCTION/SNAP-IN MOUNT

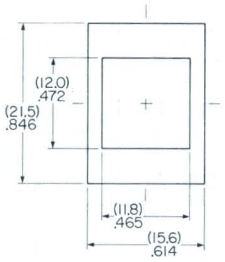
BEZELS AND LEDS

1 **AT207**
Bezel without LED

Polycarbonate

Colors:
A B C E F G H



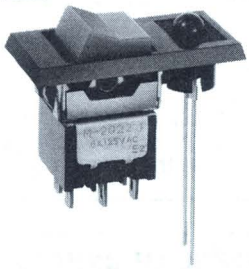


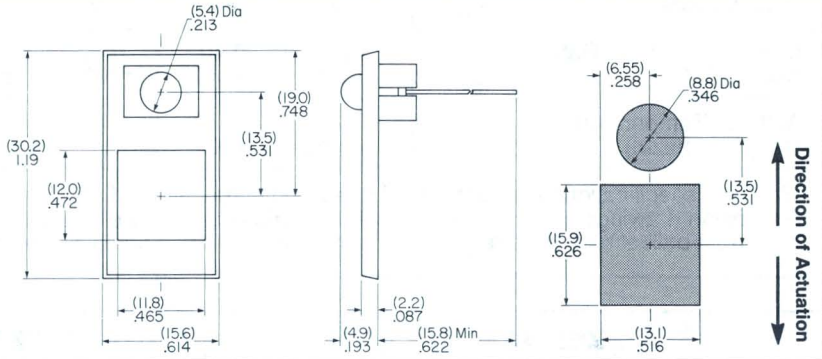
2 **AT208**
Bezel with AT070 LED

Polycarbonate

Bezel Color: A

LED Color: C, F



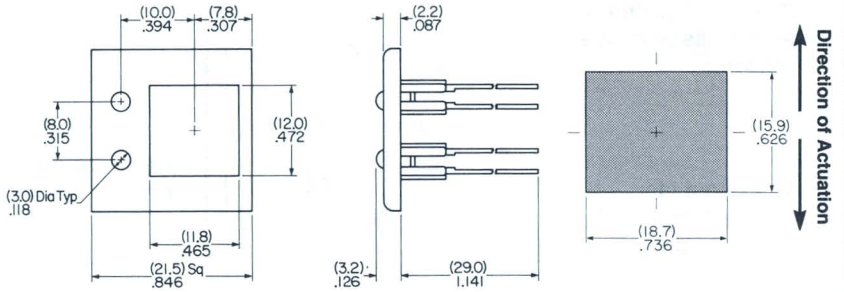


3 **AT212**
Bezel with AT617 LED

Polycarbonate

Bezel Color: A

LED Color
Combinations:
CF CE CC FE FF EE

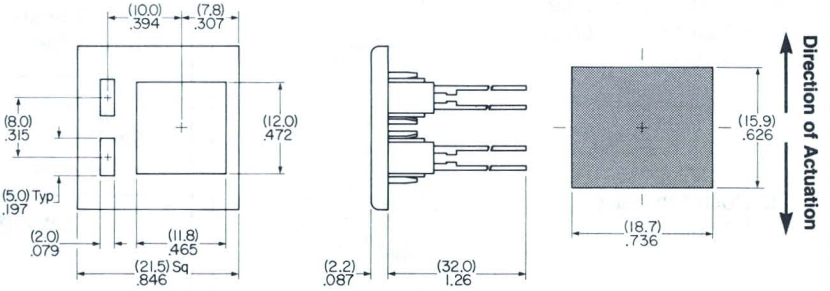


4 **AT213**
Bezel with AT618 LED

Polycarbonate

Bezel Color: A

LED Color
Combinations:
CF CE CC FE FF EE



BEZEL COLOR CODES

A Black **B** White **C** Red
E Yellow **F** Green **G** Blue **H** Gray

Standard finish is shiny. Contact the factory for matte finish.

LED COLOR CODES

C Red **CC** Red/Red
F Green **FE** Green/Yellow
CF Red/Green **FF** Green/Green
CE Red/Yellow **EE** Yellow/Yellow

NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/SNAP-IN MOUNT

LED SPECIFICATIONS

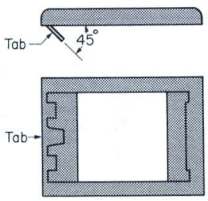
		AT070		AT617			AT618		
Lamp Color:		Red	Green	Red	Yellow	Green	Red	Yellow	Green
Forward Peak Current	I_{FM}	25mA	30mA	30mA	20mA	30mA	10mA	20mA	30mA
Continuous Forward current	I_F	20mA	20mA	24mA	16mA	24mA	8mA	16mA	24mA
Forward Voltage	V_F	2.8V	2.2V	2.01V	1.96V	1.95V	1.9V	1.9V	2.0V
Reverse Peak Voltage	V_{RM}	4V	4V	5V	4V	5V	5V	4V	5V
Current Reduction Rate Above 25°C	ΔI_F	0.33 mA/°C	0.40 mA/°C	0.40 mA/°C	0.27 mA/°C	0.40 mA/°C	0.13 0mA/°C	0.27 mA/°C	0.40 mA/°C
Ambient Temperature Range (in bezel)		-10°C ~ +70°C		-15°C ~ +70°C			-15°C ~ +70°C		

Electrical specifications are determined at a basic temperature of 25°C. Lamp circuit is independent of switch operation Dimension drawings of lamps are in the Accessories at the end of this catalog. If the source voltage exceeds the LED's rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula at the end of the catalog.

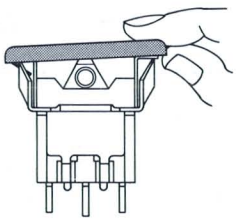
BEZEL ASSEMBLY

Bezel and switch are easily assembled as follows:

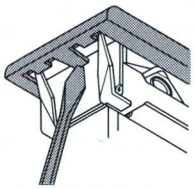
1. Pry out tab on bezel to a 45° angle.



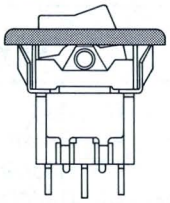
2. Insert switch frame under tab and snap on bezel.



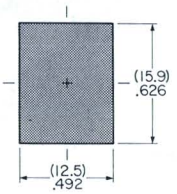
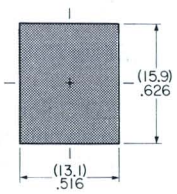
3. Push tab back into place.



4. Snap assembled bezel and switch into panel.



EFFECTIVE PANEL THICKNESS & PANEL CUTOUTS

	Single Pole	Double Pole
Panel Cutouts without Bezel		
Panel Thickness without Bezel	1mm ~ 3.2mm (.039" ~ .126")	
Panel Thickness with Bezel	1mm ~ 2.5mm (.039" ~ .098")	

SOLDERING LIMITS & WIRING SPECS

Soldering:

3 seconds at 350°C 5 seconds at 270°C

Wiring:

Solder lug terminals have a .043" X .079" oblong hole which accommodates 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

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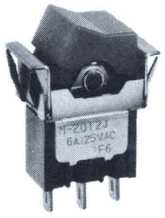
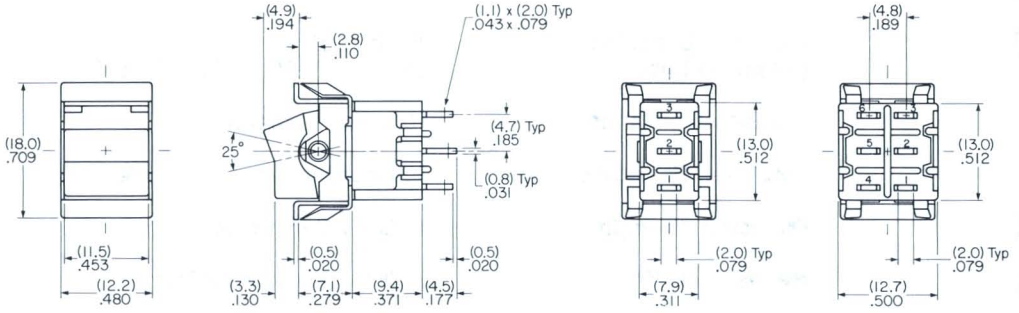
NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/SNAP-IN MOUNT

TJ Frame/Solder Lug/Single & Double Pole/without Bezel

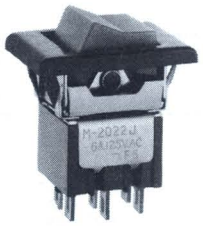


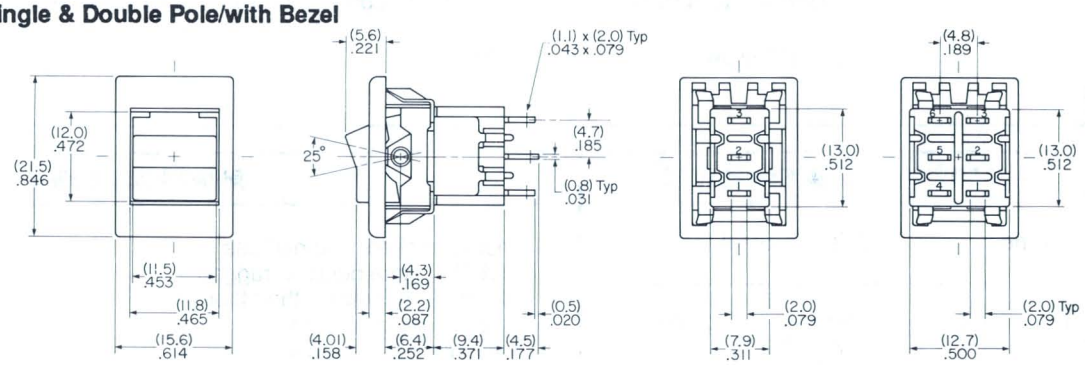


M2012TJW01-FC Model Shown

Actuator in DOWN position.

TJ Frame/Solder Lug/Single & Double Pole/with Bezel

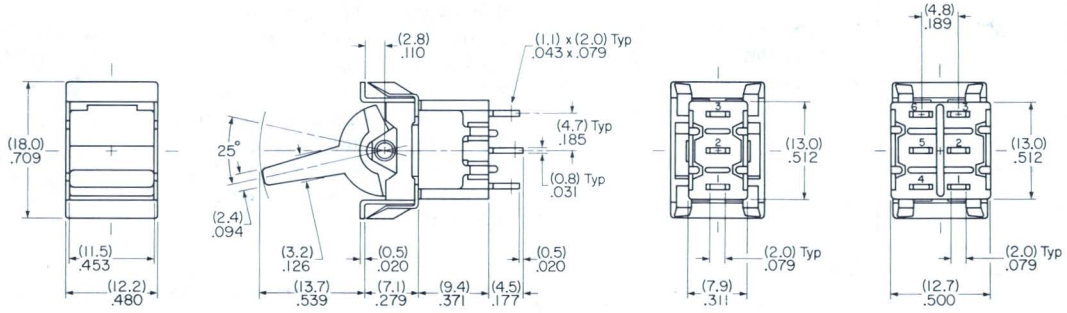




M2022TJW01-FC-1A Model Shown

Actuator in DOWN position.

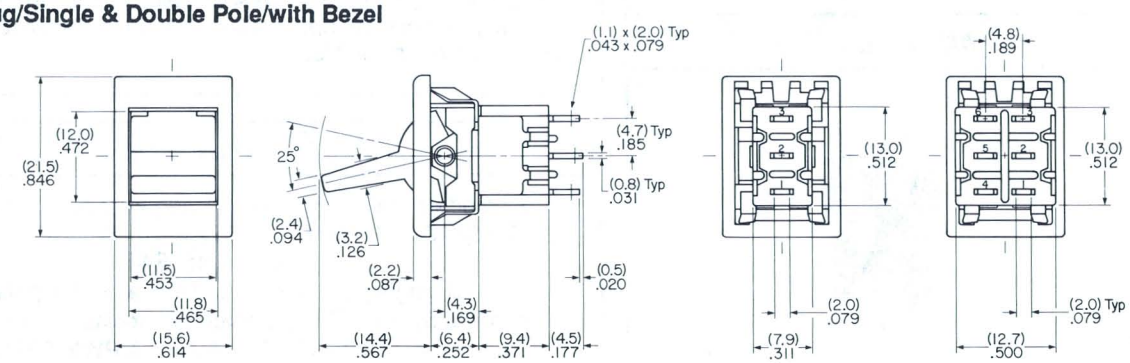
TJ Frame/Solder Lug/Single & Double Pole/without Bezel



M2012TJW01-GC Model Shown

Actuator in DOWN position.

TJ Frame/Solder Lug/Single & Double Pole/with Bezel



M2022TJW01-GC-1A Model Shown

Actuator in DOWN position.

NKK SERIES PW ROCKER SWITCHES

MINIATURE/HEAVY DUTY/SNAP-IN MOUNT

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	5A @ 125V AC 6A @ 125V AC for ON-NONE-ON models
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F)
Angle of Throw:	26°

MATERIALS & FINISHES

Frame	Stainless Steel
Dust Cover	Fiberglass reinforced polyamide
Base	Phenolic resin
Movable Contactor	Phosphor bronze with silver plating or copper with silver plating
Movable Contacts	Silver alloy
Stationary Contacts	Silver alloy
Terminals	Copper with silver plating

ACTUAL SIZE

APPLICATIONS

Snap-in rockers and paddles have the same durable, rugged construction found in the other S series devices with the convenience of snap-in mounting. The stainless steel frame resists corrosion and provides for secure mounting over a wide range of panel thicknesses. This device carries a healthy 5 amp rating yet has a compact case with a behind panel depth of less than .850". Typical applications for these miniature rockers are found in test, aircraft and medical instruments; as well as, industrial machines and equipment.

Series PW rockers are available in single or double pole models with a variety of momentary or maintained circuit options. Securely staked solder lug terminals eliminate the need for epoxy seal, and a longer center solder lug terminal makes wiring easier. Users may select from two styles of paddles or a rocker in seven colors. To enhance front panel appearance, an optional bezel is offered or bezels with LED illumination are available.

UL & CSA

All models are recognized by Underwriters Laboratories Inc. for 5A @ 125V AC or 6A @ 125V AC for ON-NONE-ON models.
UL File No. E44145
All single pole models and some double pole models are certified by Canadian Standards Association: single pole models & PW2025 & PW2029 for 5A @ 125V AC & PW2022 for 6A @ 125V AC.
CSA File Nos. LR23535 and LR56017.

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SERIES PW ROCKER SWITCHES

MINIATURE/HEAVY DUTY/SNAP-IN MOUNT

TYPICAL SWITCH ORDERING EXAMPLE

PW20 1 2 — 2 C — ☐

POLES	
1	SPDT
2	DPDT

CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)

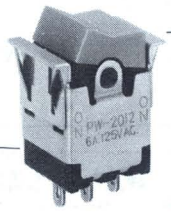
CAPS	
1	Paddle
2	Rocker
3	Curved Paddle

CAP COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

BEZEL COLORS	
No Code	No Bezel
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (PW2012-2C):

SERIES PW ROCKER



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

NKK SERIES PW ROCKER SWITCHES

MINIATURE/HEAVY DUTY/SNAP-IN MOUNT

POLES & CIRCUITS

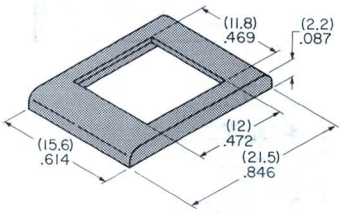
POLE & THROW	MODEL	ROCKER POSITION & TERMINAL NUMBERS ( ) = Momentary Down	Center	Up
SPDT	PW2012	ON	NONE	ON
	PW2013	ON	OFF	ON
	PW2015	ON	NONE	(ON)
	PW2018	(ON)	OFF	(ON)
	PW2019	ON	OFF	(ON)
CONNECTED TERMINALS		2-3	OPEN	2-1
SCHEMATIC				
DPDT	PW2022	ON	NONE	ON
	PW2023	ON	OFF	ON
	PW2025	ON	NONE	(ON)
	PW2028	(ON)	OFF	(ON)
	PW2029	ON	OFF	(ON)
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4
SCHEMATIC				

Terminal numbers are not actually on the switch.

OPTIONAL BEZEL & BEZEL COLORS

AT207 Bezel

Polycarbonate



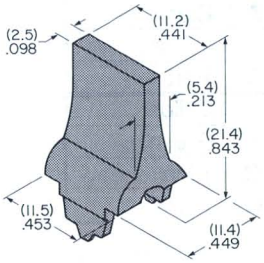
- **A** Black
- **B** White
- **C** Red
- **E** Yellow
- **F** Green
- **G** Blue
- **H** Gray

Standard finish is glossy.
For matte finish, contact factory.

CAP & CAP COLORS

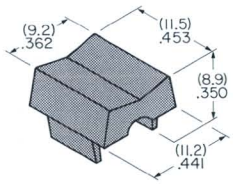
1 AT436 Paddle

Polycarbonate



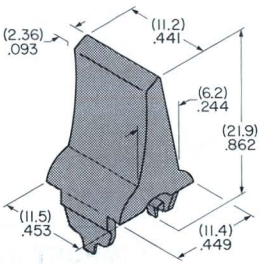
2 AT437 Rocker

Polycarbonate



3 AT458 Curved Paddle

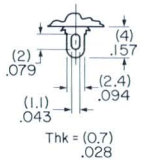
Polycarbonate



Colors Available:
A Black **B** White **C** Red
E Yellow **F** Green **G** Blue **H** Gray

Standard finish is glossy.
For matte finish, contact factory.

TERMINALS

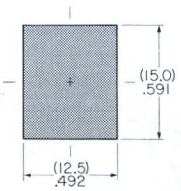


SOLDERING & WIRING

Soldering Limits:
3 seconds @ 350°C
5 seconds @ 270°C

Wiring:
Solder lug terminals have .043" X .079" oblong holes which accommodate 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

PANEL CUTOUT & PANEL THICKNESS

PANEL CUTOUT	PANEL THICKNESS	
Single & Double Pole 	Without Bezel:	1mm ~ 3.2mm (.039" ~ .126")
	With Bezel:	1mm ~ 2.5mm (.039" ~ .098")

OPTIONAL BEZELS WITH LEDS

Several bezels with LEDs, AT208, AT212 and AT213 are available for use with PW rockers. Dimension drawings, panel cutouts, LED color codes and LED lamp specifications appear in Series E Snap-in Pushbutton Section (EB). Bezel assembly instructions may be found in Series M Snap-in Rocker Section. When ordering, specify both the bezel AT number and the LED color code.

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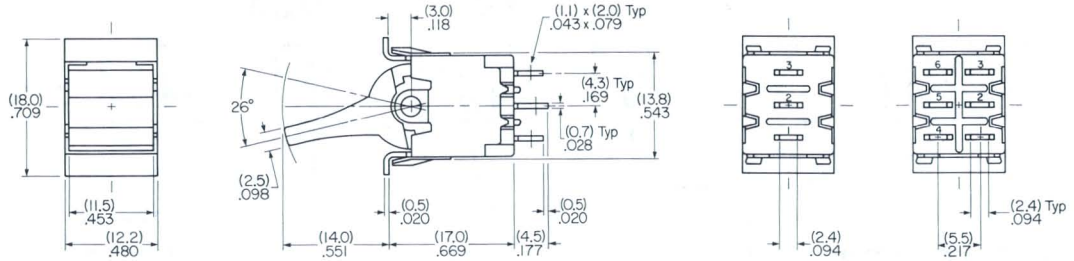
NKK SERIES PW ROCKER SWITCHES

MINIATURE/HEAVY DUTY/SNAP-IN MOUNT

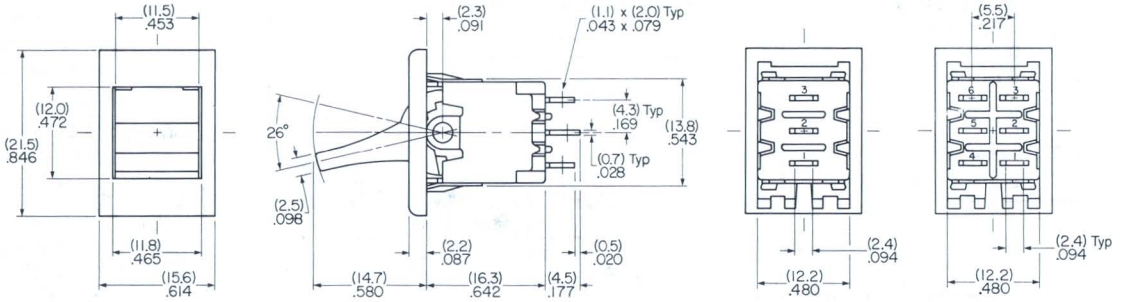
Paddle without Bezel/Solder Lug/1 & 2 Pole



PW2012-1C Model Shown

Actuator in DOWN position.

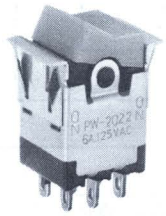
Paddle with Bezel/Solder Lug/1 & 2 Pole

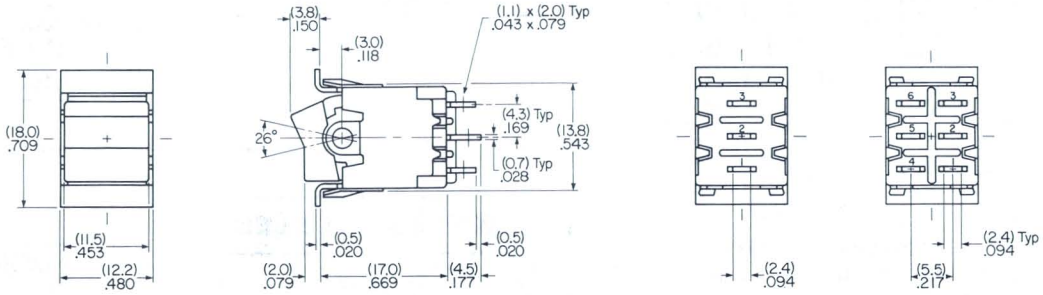


PW2022-1C-A Model Shown

Actuator in DOWN position.

Rocker without Bezel/Solder Lug/1 & 2 Pole

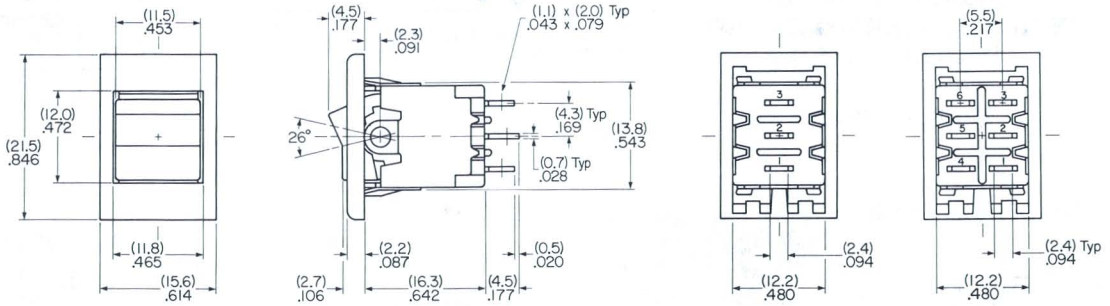




PW2022-2C Model Shown

Actuator in DOWN position.

Rocker with Bezel/Solder Lug/1 & 2 Pole



PW2012-2C-A Model Shown

Actuator in DOWN position.

NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

TYPICAL BRACKETED

FOR SMALL ROCKERS & PADDLES

M20 1 3 TX G 41 — D C

POLES	
1	SPDT
2	DPDT SP3T
3	3PDT Used w/terminal code 30 & 41 only
4	4PDT DP3T Used w/terminal code 41 only

ACTUATOR/ MOUNTING TYPE	
TX	Small Actuator with Straight or Angle PC Mount

CONTACT MATERIALS & RATINGS	
W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

TERMINALS	
Straight PC with Bracket (1-2 Pole only)	
13	.250" Straight PC with .465" Bracket
15	.425" Straight PC with .630" Bracket
17	.964" Straight PC with 1.150" Bracket
Straight PC w/Reinforced Bracket (1-2 Pole only)	
23	.250" Straight PC with .465" Bracket
25	.425" Straight PC with .630" Bracket
26	.750" Straight PC with .953" Bracket
Right Angle PC w/Support (1-3 Pole only)	
30	.150" Right Angle PC
Vertical PC w/Support (1-4 Pole only)	
41	.150" Vertical PC

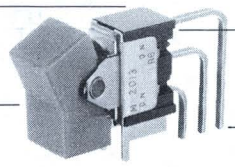
CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
4*	ON	ON	ON
6*	(ON)	ON	(ON)
7*	ON	ON	(ON)
( ) = Momentary			
* 3-ON circuits available with double and four pole bases only.			

ROCKERS & PADDLES	
D	.365" Wide Rocker
E	.365" Wide Paddle
F	.453" Wide Rocker
G	.453" Wide Paddle
S	.465" False Illuminated Rocker in black only
K	.476" Wide Paddle

ROCKER & PADDLE COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2013TXG41-DC)

SERIES M ROCKER



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

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SWITCH ORDERING EXAMPLES

FOR LARGE ROCKER & PADDLE

M20 2 2 TZ G 23 — J C

POLES

1	SPDT
2	DPDT SP3T
3	3PDT
4	4PDT DP3T

3 pole & 4 pole used with terminal code 24 only

ACTUATOR/ MOUNTING TYPE

TZ	Large Actuator with Straight PC Mount

CONTACT MATERIALS & RATINGS

W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

TERMINALS

Straight PC with Bracket	
13	.250" Straight PC with .465" Bracket
15	.425" Straight PC with .630" Bracket
17	.964" Straight PC with 1.150" Bracket
Straight PC with Reinforced Bracket	
23	.250" Straight PC with .465" Bracket
24	.250" Straight PC with .548" Extended Bracket
25	.425" Straight PC with .630" Bracket
26	.750" Straight PC with .953" Bracket

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
4*	ON	ON	ON
6*	(ON)	ON	(ON)
7*	ON	ON	(ON)

( ) = Momentary

* 3-ON circuits available with double and four pole bases only.

ROCKER & PADDLE

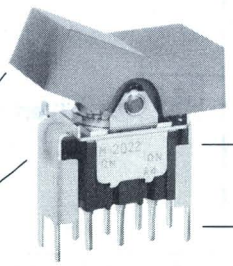
J	.598" Wide Rocker
H	.598" Wide Paddle

ROCKER & PADDLE COLORS

A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2022TZG23-JC)

SERIES M ROCKER



Red .598" Wide Rocker

DPDT ON-NONE-ON Circuit

Gold Contacts with 0.4VA Rating

.250" Straight PC Terminals with Reinforced Bracket

NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

POLES & CIRCUITS

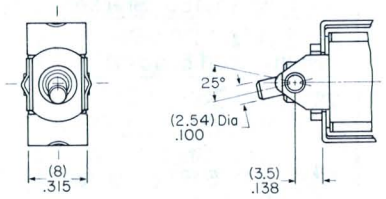
For poles and circuit information, refer to the details contained in the Poles & Circuits Chart appearing in the previous flat frame section.

ACTUATOR/MOUNTING TYPES

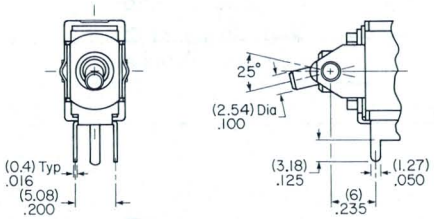
TX **Small Actuator with Straight or Angle PC Mount**

The TX code describes a device which accepts a small actuator and mounts to a PC board with a bracket or support depending upon terminal selected. Note: Not for use with terminal code 24.

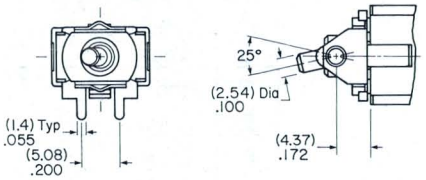
Straight PC Mounting



Vertical PC Mounting

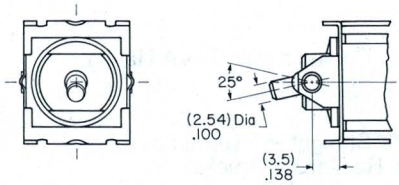


Right Angle PC Mounting



TZ **Large Actuator with Straight PC Mount**

The TZ code describes a device which accepts a large actuator and mounts to a PC board with a bracket. Note: Not for use with terminal code 30 & 41.



CONTACT MATERIALS & RATINGS

W **Silver over Silver**
Rated 6A @ 125V AC & 3A @ 250V AC

A **Gold over Silver**
Rated 6A @ 125V AC & 0.4VA maximum @ 28V AC/DC maximum

G **Gold over Brass or Copper**
Rated 0.4VA maximum @ 28V AC/DC maximum

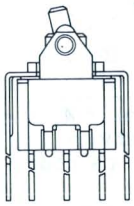
TERMINALS

For TX and TZ
Straight PC Mount with Bracket (1-2 pole)

13 .250" Straight PC with .465" Bracket

15 .425"Straight PC with .630" Bracket

17 .964"Straight PC with 1.150" Bracket

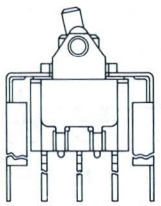


Straight PC Mount with Reinforced Bracket (1-2 pole)

23 .250"Straight PC with .465" Bracket

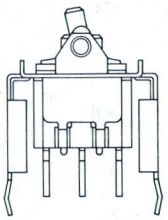
25 .425"Straight PC with .630" Bracket

26 .750"Straight PC with .953" Bracket



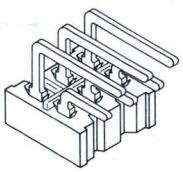
For TZ
Straight PC Mount with Extended Bracket (1-4 pole)

24 .250"Straight PC with .548" Extended Bracket



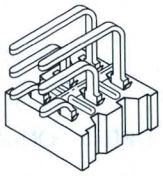
For TX
Right Angle PC Mount (1-3 pole)

30 .150"Right Angle PC



Vertical PC Mount (1-4 pole)

41 .150"Vertical PC



Full dimensioned drawings appear at the end of this rocker section.

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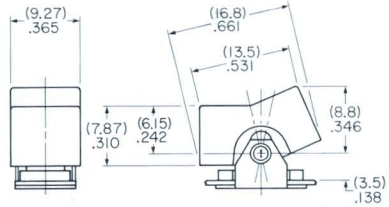
NKK SERIES M ROCKER SWITCHES

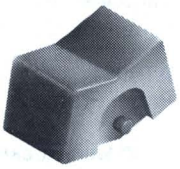
SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

ROCKERS & PADDLES

Used with TX code only

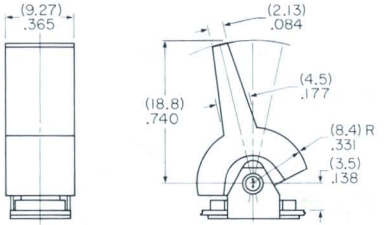
D **AT4148**
.365″ Wide Rocker

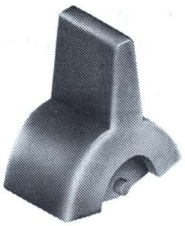




Nylon

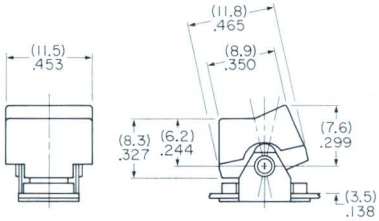
E **AT4149**
.365″ Wide Paddle





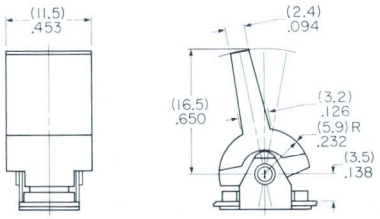
Nylon

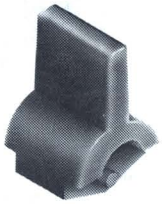
F **AT4150**
.453″ Wide Rocker



Nylon

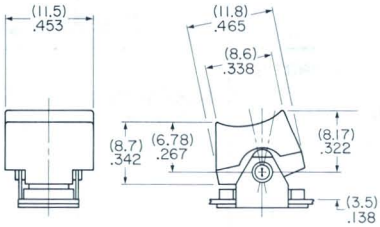
G **AT4151**
.453″ Wide Paddle





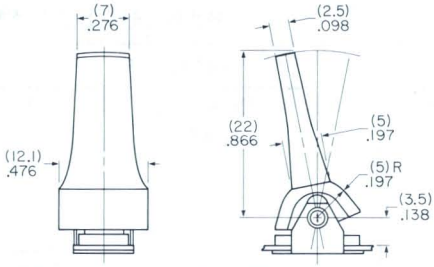
Nylon

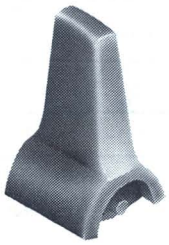
S **AT466**
.453" False Illuminated Rocker



Cap is black with red and white false illuminator.
Polycarbonate and Acrylonitrile Butadiene Styrene

K **AT461**
.476″ Wide Paddle

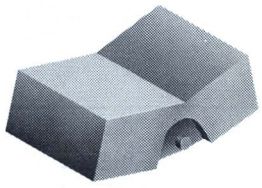




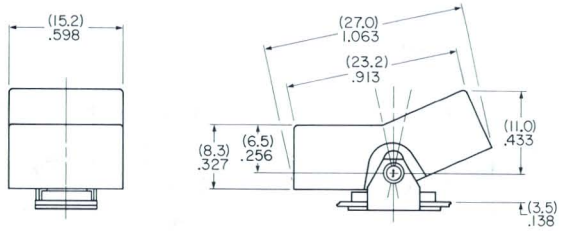
Polycarbonate

Used with TZ code only

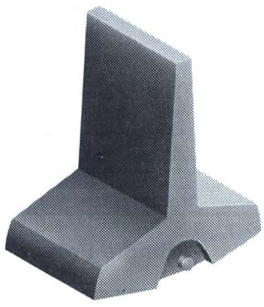
J **AT4156**
.598″ Wide Rocker



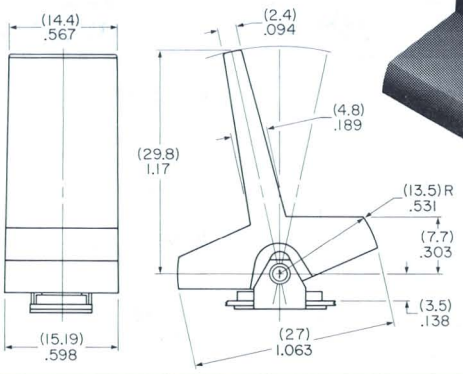
Nylon



H **AT4157**
.598″ Wide Paddle



Nylon



Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

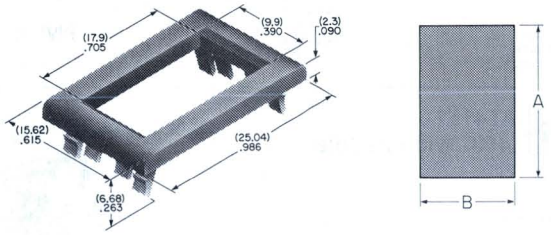
OPTIONAL PANEL FRAMES

Shiny black polyamide panel frames are available for small rockers and paddles. Two sizes of frames are available to accommodate different size actuators. Each frame adapts to the range of panel thicknesses and panel cutout tolerances given in the table. Frames snap directly into panel openings and mount separately from switches. Switches must be aligned with the panel cutout to allow for the proper clearance between the actuator and panel frame.

AT0641
Panel Frame

AT0642
Panel Frame

Used with Rocker AT4148 or Paddle AT4149

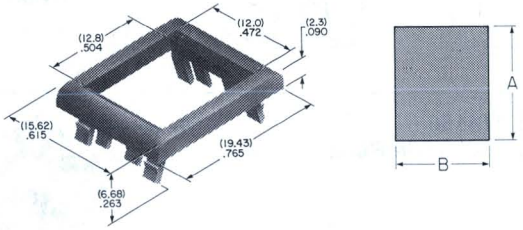


Part Number	Panel Thickness	Dim. A	Dim. B
AT0641	1.2 ~ 2.3mm (.047 ~ .090")	20.24 ~ 20.4mm (.797 ~ .803")	12.57 ~ 12.83mm (.495 ~ .505")
AT0642	1.57 ~ 3.18mm (.062 ~ .125")		

AT0651
Panel Frame

AT0652
Panel Frame

Used with Rockers AT4150 and AT466 or Paddle AT4151

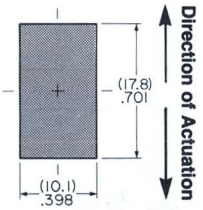


Part Number	Panel Thickness	Dim. A	Dim. B
AT0651	1.2mm (.047")	15.11 ~ 15.37mm (.595 ~ .605")	12.57 ~ 12.7mm (.495 ~.500")
AT0652	1.57mm (.062")		
AT0651	2.3mm (.090")	15.75 ~ 15.88mm (.620 ~ .625")	
AT0652	3.18mm (.125")		

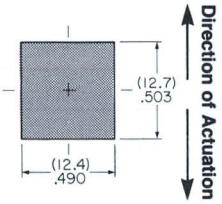
PANEL CUTOUTS

For Small Actuators

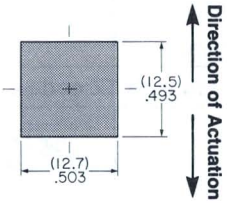
Used with AT4148 & AT4149



Used with AT4150, AT4151 & AT466

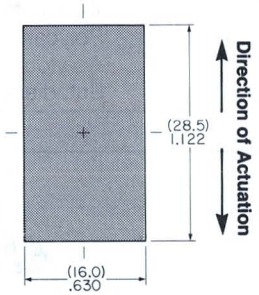


Used with AT461



For Large Actuators

Used with AT4156 & AT4157



SOLDERING

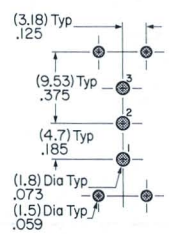
Soldering Time & Temperature Limits:

3 seconds
@ 350°C

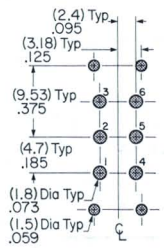
5 seconds
@ 270°C

STRAIGHT PCB MOUNTING WITH EXTENDED BRACKET

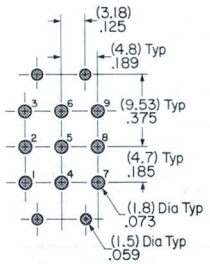
Single Pole



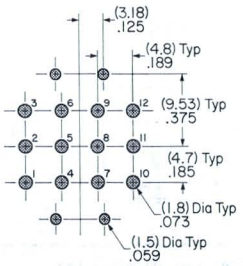
Double Pole



Three Pole



Four Pole



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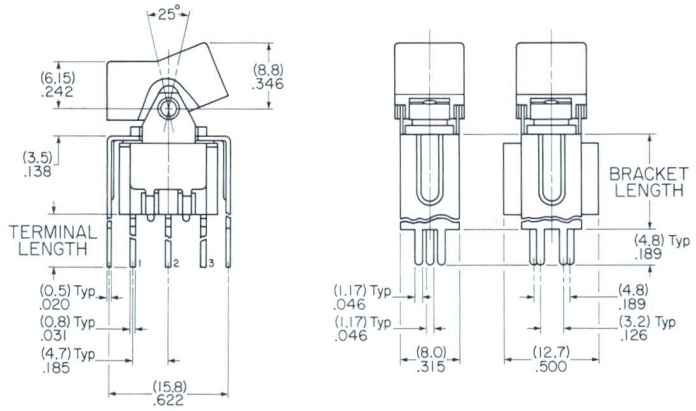
NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

Small Rocker/Straight PC with Bracket/Single & Double Pole

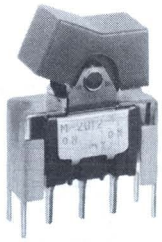
M2012TXG13-DC Model Shown

Terminal Code	Terminal Length	Bracket Length
13	.250" (6.4mm)	.465" (11.8mm)
15	.425" (10.8mm)	.630" (16.0mm)
17	.964" (25.5mm)	1.150" (29.2mm)



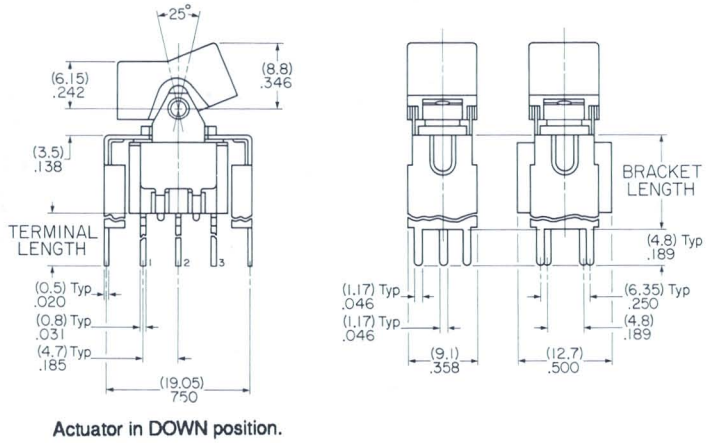
Actuator in DOWN position.

Small Rocker/Straight PC with Reinforced Bracket/Single & Double Pole



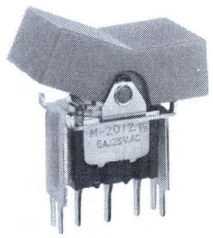
M2012TXG23-DC Model Shown

Terminal Code	Terminal Length	Bracket Length
23	.250" (6.4mm)	.465" (11.8mm)
25	.425" (10.8mm)	.630" (16.0mm)
26	.750" (19.05mm)	.953" (24.2mm)



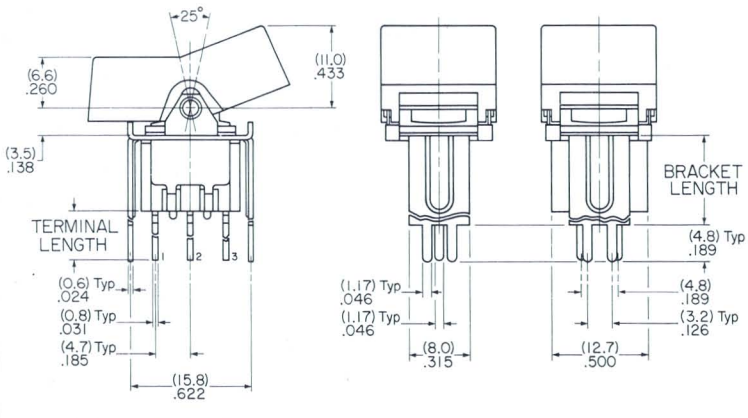
Actuator in DOWN position.

Large Rocker/Straight PC with Bracket/Single & Double Pole



M2012TZG13-JC Model Shown

Terminal Code	Terminal Length	Bracket Length
13	.250" (6.4mm)	.465" (11.8mm)
15	.425" (10.8mm)	.630" (16.0mm)
17	.964" (25.5mm)	1.150" (29.2mm)

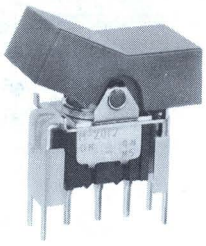


Actuator in DOWN position.

NKK SERIES M ROCKER SWITCHES

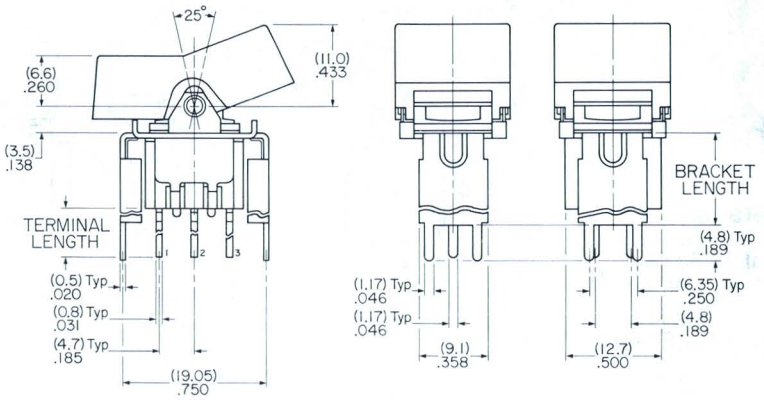
SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

Large Rocker/Straight PC with Reinforced Bracket/Single & Double Pole



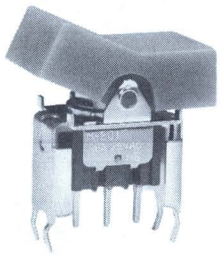
M2012TZG23-JC Model Shown

Terminal Code	Terminal Length	Bracket Length
23	.250" (6.4mm)	.465" (11.8mm)
25	.425" (10.8mm)	.630" (16.0mm)
26	.750" (19.05mm)	.953" (24.2mm)

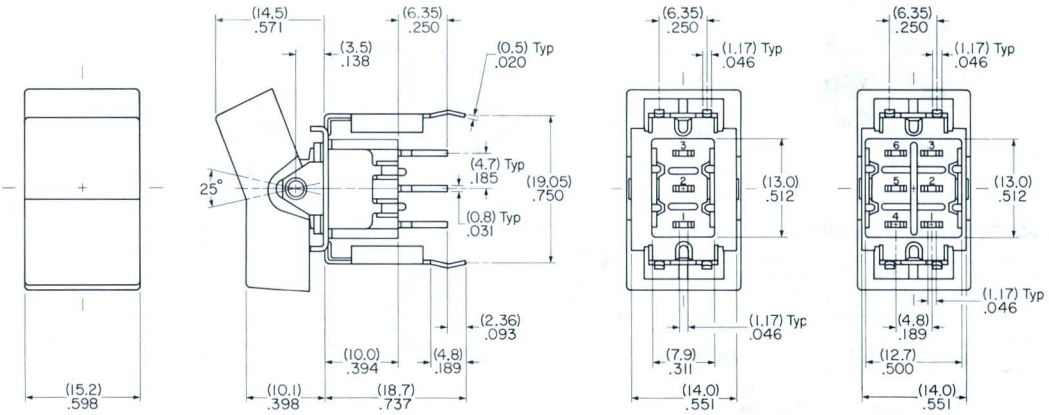


Actuator in DOWN position.

Large Rocker/Straight PC with Extended Bracket/Single & Double Pole

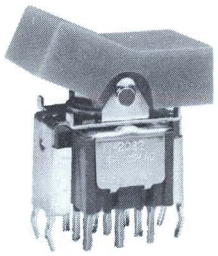


M2012TZG24-JC Model Shown

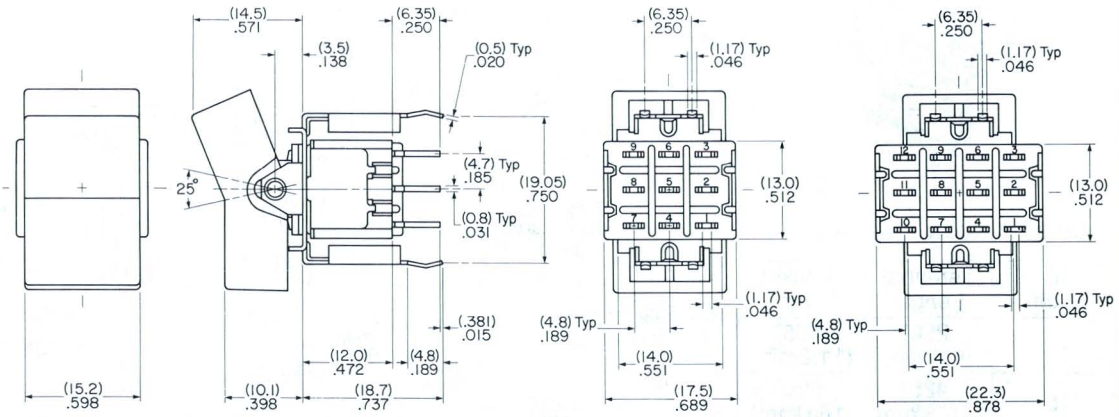


Actuator in DOWN position.

Large Rocker/Straight PC with Extended Bracket/Three & Four Pole



M2032TZG24-JC Model Shown



Actuator in DOWN position.

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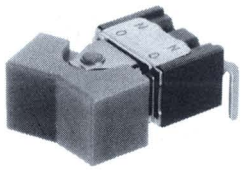
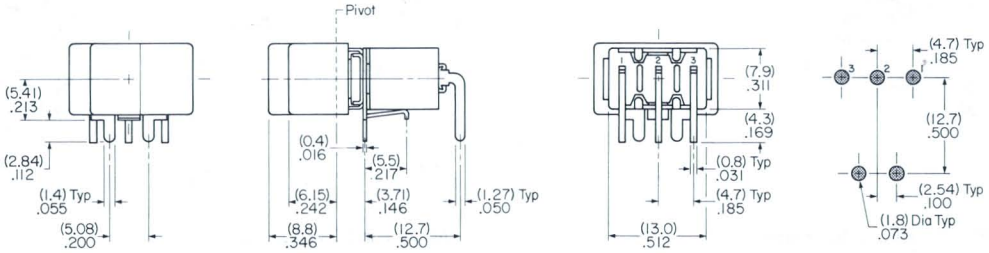
NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

Small Rocker/.150" Right Angle PC/Single Pole

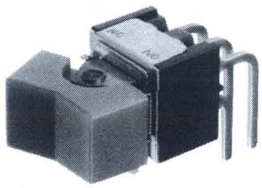


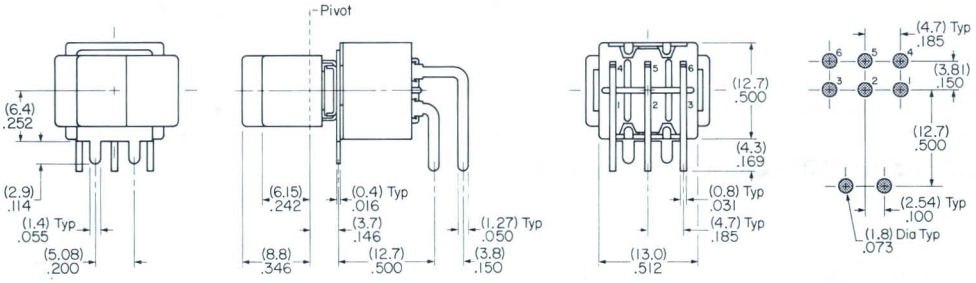


M2012TXG30-DC Model Shown

Actuator in DOWN position.

Small Rocker/.150" Right Angle PC/Double Pole

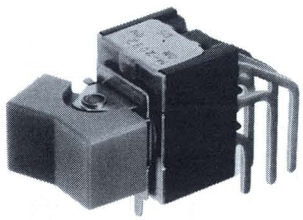


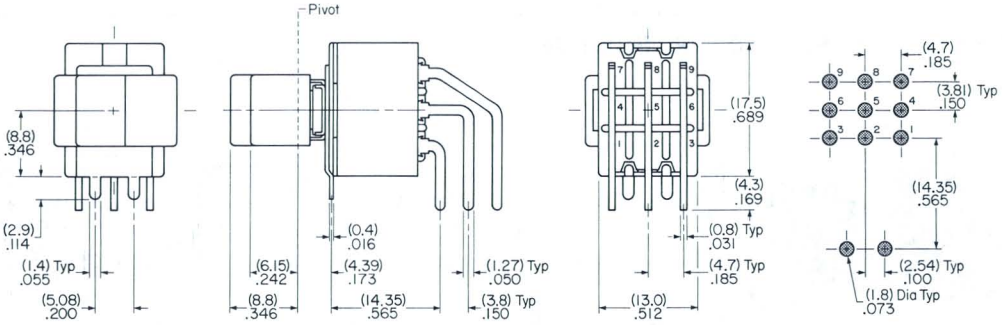


M2022TXG30-DC Model Shown

Actuator in DOWN position.

Small Rocker/.150" Right Angle PC/Three Pole





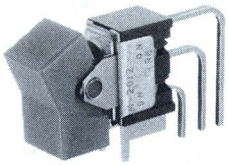
M2032TXG30-DC Model Shown

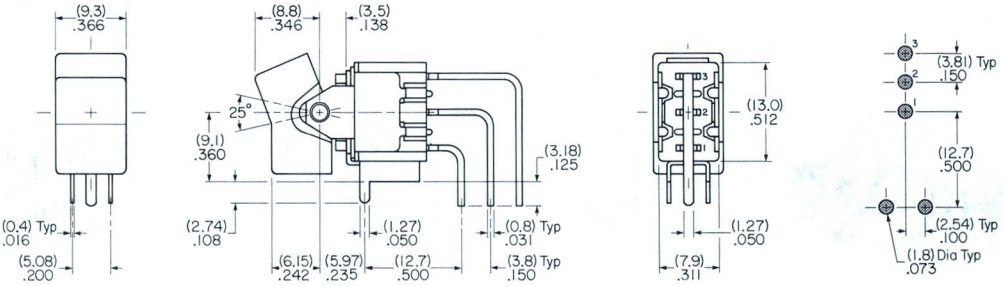
Actuator in DOWN position.

NKK SERIES M ROCKER SWITCHES

SUBMINIATURE/MULTI-FUNCTION/BRACKETED PC MOUNT

Small Rocker/.150" Vertical PC/Single Pole

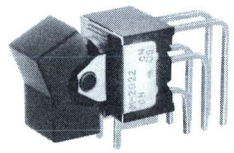


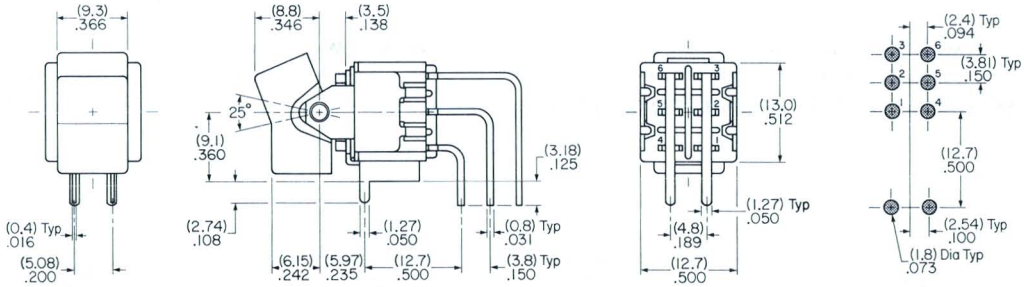


M2012TXG41-DC Model Shown

Actuator in DOWN position.

Small Rocker/.150" Vertical PC/Double Pole

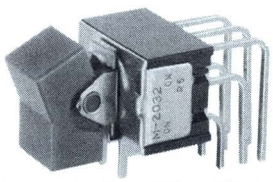


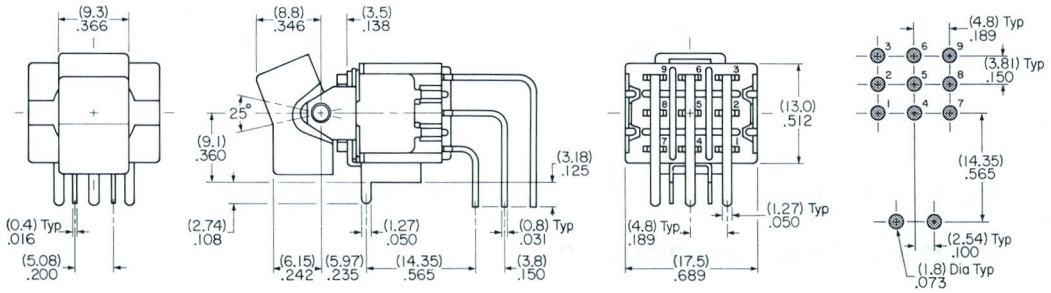


M2022TXG41-DC Model Shown

Actuator in DOWN position.

Small Rocker/.150" Vertical PC/Three Pole

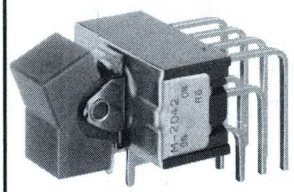


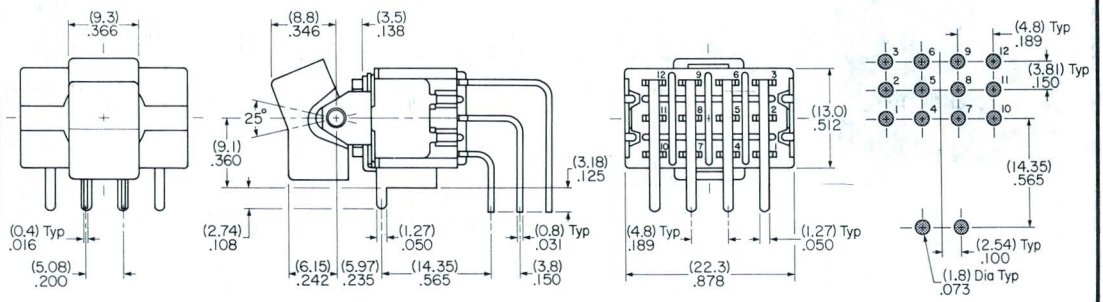


M2032TXG41-DC Model Shown

Actuator in DOWN position.

Small Rocker/.150" Vertical PC/Four Pole





M2042TXG41-DC Model Shown

Actuator in DOWN position.

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NKK SERIES M PUSHBUTTON SWITCHES

SUBMINIATURE/MOMENTARY & ALERNATE/1-4 POLE

M SERIES PUSHBUTTONS - MB2000

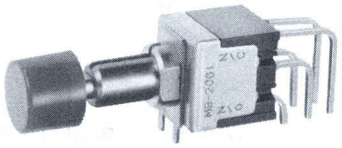
These pushbutton switches are available in single, double and four pole models with either momentary or alternate action circuits. A large number of options make MB2000 switches extremely versatile. Screw-on or snap-on caps in seven colors; 1/4", 6mm, or large 12mm diameter threaded bushings, and a .244" smooth bushing; ratings of 6A or 0.4VA plus a dual rating; and numerous terminal options make these switches suitable for a variety of applications. This series offers many accessories such as: splashproof boots, mounters, colored shrouds and conical nuts which enhance front panel appearance.

MB2000 is divided into sections by mounting types: Bushing Mount, Bracketed & Angle PC Mount and Large Bushing Mount. In the beginning of each of these sections, a Typical Ordering Example outlines the different options available for each mounting type. Detail pages following each ordering example provide additional information regarding the options outlined and accessories available.

Bushing Mount
Pages M51 - M57

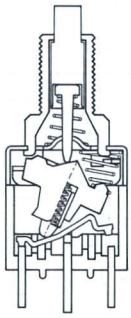
Large Bushing Mount
Pages M64 - M68

Bracketed & Angle PC Mount
Pages M58 - M63



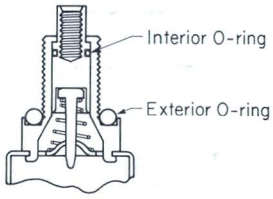
CONTACT MECHANISM

The MB2000 is a slow make, slow break device which employs an over center actuator block. This design feature diminishes sparking and increases operating life in AC circuits. A guide interlocked with the actuator block prevents window locking and maintains correct plunger alignment to assure contact stability.



SPLASHPROOF OPTION

A splashproof feature is incorporated into the .335" long threaded bushing. An o-ring within the bushing itself and one under the face nut protect the switch from splashed, sprayed or spilled water and other liquids. MB2000 devices ordered with the D3 bushing code provide this splashproof characteristic.



NKK SERIES M PUSHBUTTON SWITCHES

SUBMINIATURE/MOMENTARY & ALERNATE/1-4 POLE

GENERAL SPECIFICATIONS

Electrical Capacity:
(Resistive Load)
6A @ 125V AC or 3A @ 250V AC
6A @ 30V DC
0.4VA maximum @ 28V maximum AC/DC
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)

Contact Resistance:
10 milliohms maximum for silver
20 milliohms maximum for gold

Insulation Resistance:
1,000 megohms minimum @ 500V DC

Dielectric Strength:
1,000V AC minimum between contacts
1,500V AC minimum between contacts and case

Mechanical Life:
100,000 operations minimum
50,000 operations minimum for splashproof devices

Electrical Life:
25,000 operations minimum for silver
50,000 operations minimum for gold

Nominal Operating Force:

	Momentary	Alternate Action
Single Pole	950 grams	450 grams
Double Pole	1,650 grams	720 grams
Four Pole	1,700 grams	1,020 grams

Ambient Temp Range:
-15°C through +85°C (+5°F through +185°F)
Optional low temperature lubricant available

MATERIALS & FINISHES

Plunger	Brass w/nickel plating or polyacetal resin
Bushing	Brass with nickel plating
Frame	Stainless steel
Case	Diallyphthalate resin
Movable Contactor	Phosphor bronze with silver or gold plating*
Movable Contacts	Silver alloy (code W); silver alloy with gold plating* over nickel (code A); or copper with gold plating* over nickel (code G)
Stationary Contacts	Silver with silver plating (code W); silver with gold plating* over nickel (code A); or copper or brass with gold plating* over nickel (code G)
Terminals	Copper or brass with silver plating; copper or brass with gold plating over nickel

* Gold plating on contacts is 1 micron minimum.

UL & CSA

All models with ratings of 6A @ 125V AC, 3A @ 250V AC, and 0.4VA @ 28V AC/DC are recognized by Underwriters Laboratories Inc.

UL File No. E44145

All models rated 6A @ 125V AC, 3A @ 250V AC, and 0.4VA @ 28V AC/DC with PC terminals, plus single pole models with solder lug or wirewrap terminals are certified by Canadian Standards Association.

CSA File Nos. LR 23535 and LR56017

PLUNGER TRAVEL

	With Screw-on Cap		With Snap-on Caps
	Momentary	Alternate Action	Momentary & Alternate Action
Pretravel	0.71mm (.028")	2.80mm (.110")	3.19mm (.125")
Overtravel	1.09mm (.043")	1.10mm (.043")	1.26mm (.050")
Total Travel	1.80mm (.071")	3.90mm (.153")	4.45mm (.175")

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NKK SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/1-4 POLE/BUSHING MOUNT

TYPICAL BUSHING MOUNT SWITCH ORDERING EXAMPLE

MB 2011 S S1 W 01 — C C

POLES & CIRCUITS

2011	SPDT	ON	(ON)
2065	SPDT	ON	ON
2061	DPDT	ON	(ON)
2085	DPDT	ON	ON
2181	4PDT	ON	(ON)
2185	4PDT	ON	ON

( ) = Momentary

PLUNGER TYPES

S	Plunger for Screw-on Caps
L	Plunger for Snap-on Caps

CONTACT MATERIALS & RATINGS

W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA maximum @ 28V AC/DC maximum
G	Gold Rated 0.4VA maximum @ 28V AC/DC maximum

CAPS

B	.315" Dia.
C	.394" Dia.

CAP COLORS

A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

BUSHINGS

S1	.335" Threaded with Keyway
S2	.335" Smooth with Keyway
S4	.335" Threaded 6mm with Keyway
D1	.335" Threaded with D Flat
D3	.335" Threaded Splashproof without Keyway

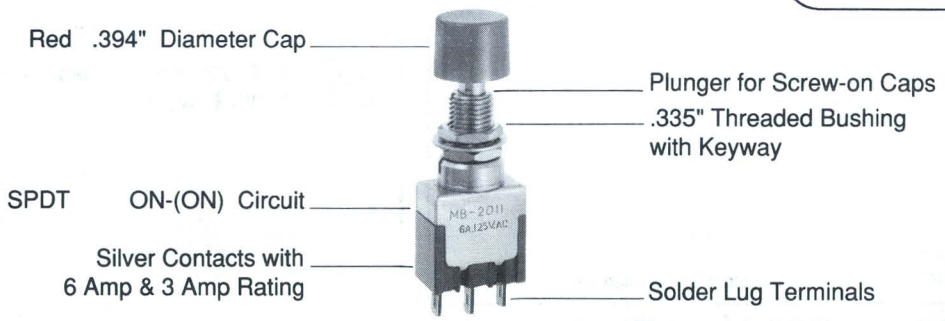
TERMINALS

01	Solder Lug
02	Quick Connect
03	.250" Straight PC
05	.425" Wirewrap
06	.750" Wirewrap
07	.964" Wirewrap
08	1.062" Wirewrap

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MB2011SS1W01-CC):

SERIES M PUSHBUTTON

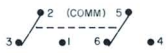
IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.



NKK SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/1-4 POLE/BUSHING MOUNT

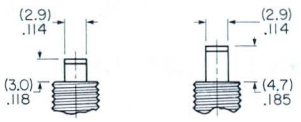
POLES & CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary Normal	Down
SPDT	MB2011 MB2065	ON ON	(ON) ON
CONNECTED TERMINALS		2-3	2-1
SCHEMATIC			
DPDT	MB2061 MB2085	ON ON	(ON) ON
CONNECTED TERMINALS		2-3 5-6	2-1 5-4
SCHEMATIC			
4PDT	MB2181 MB2185	ON ON	(ON) ON
CONNECTED TERMINALS		2-3 5-6 8-9 11-12	2-1 5-4 8-7 11-10
SCHEMATIC			

Terminal numbers are not actually on the switch.

PLUNGER TYPES

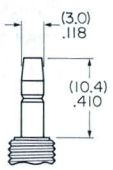
S Plunger for Screw-on Caps



Used with caps AT407 & AT413

Momentary Alternate

L Plunger for Snap-on Caps



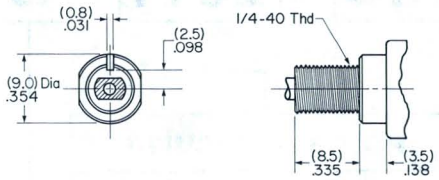
Used with caps AT442 & AT443

Momentary & Alternate

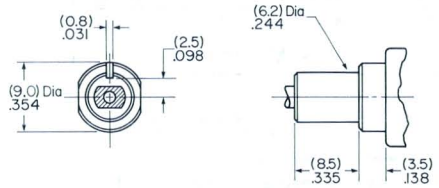
On alternate action models, after transferring circuit, the plunger returns to its original position and does not latch down.

BUSHINGS

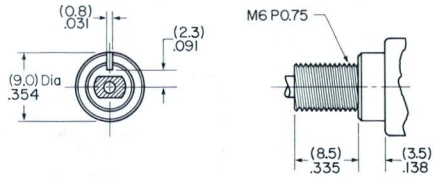
S1 .335" Threaded with Keyway



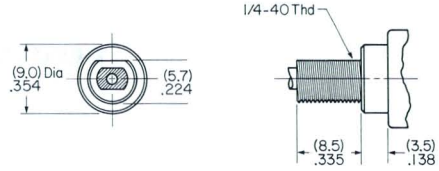
S2 .335" Smooth with Keyway



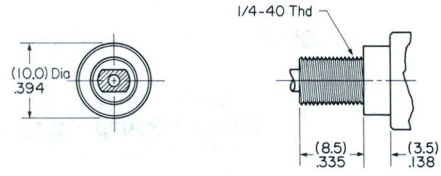
S4 .335" Threaded 6mm with Keyway



D1 .335" Threaded with D Flat



D3 .335" Threaded Splashproof without Keyway



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NKK SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/1-4 POLE/BUSHING MOUNT

CONTACT MATERIALS & RATINGS

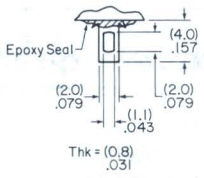
W Silver over Silver
Rated 6A @ 125V AC &
3A @ 250V AC

A Gold over Silver
Rated 6A @ 125V AC &
0.4VA maximum @ 28V AC/DC maximum

G Gold over Brass or Copper
Rated 0.4VA maximum @ 28V AC/DC
maximum

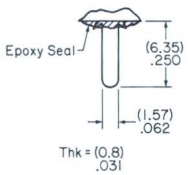
TERMINALS

01 Solder Lug

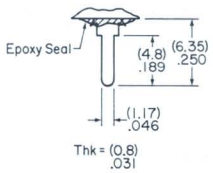


02 .062" Wide Quick Connect

Corresponds to
AMP #60900-1 receptacle



03 .250" Straight PC



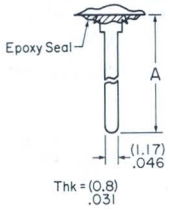
Wirewrap

05 .425" (10.8mm)

06 .750" (19.05mm)

07 .964" (24.5mm)

08 1.062" (27.0mm)



Dimension A = wirewrap terminal lengths as shown beside code boxes.

CAPS

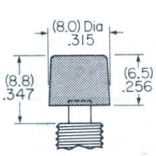
B .315" Diameter

AT413
Screw-on Cap
Polystyrene

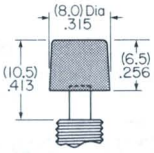
For use with Plunger Code S

AT443
Snap-on Cap
Polycarbonate

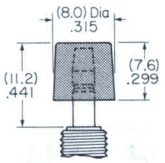
For use with Plunger Code L



Momentary



Alternate



Momentary & Alternate

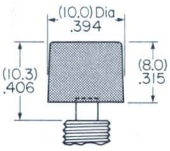
C .394" Diameter

AT407
Screw-on Cap
Polystyrene

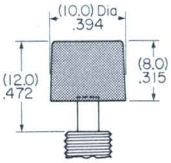
For use with Plunger Code S

AT442
Snap-on Cap
Polycarbonate

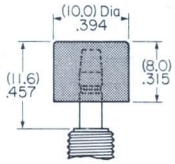
For use with Plunger Code L



Momentary



Alternate

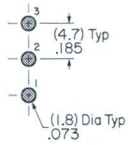
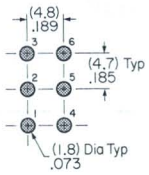
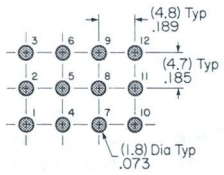


Momentary & Alternate

Colors Available:

A Black **B** White **C** Red **E** Yellow **F** Green
G Blue **H** Gray

PC BOARD MOUNTING

Single Pole	Double Pole	Four Pole
		

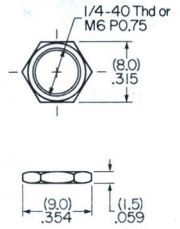
NKK SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/1-4 POLE/BUSHING MOUNT

STANDARD MOUNTING HARDWARE

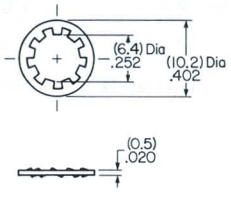
AT513H for Inch
AT513M for Metric
Hex Nut

Brass, nickel plated



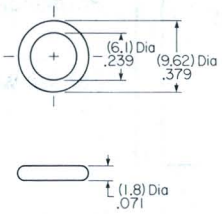
AT509
Lockwasher

Steel, chromate over zinc plating



AT516
O-ring for Splash-proof Bushing

Nitrile butadiene rubber

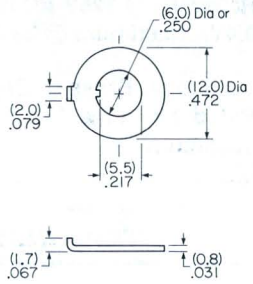


Hardware included with each switch, except splashproof: Two AT513 (H or M) and one AT509. Splashproof models include: One AT513H and one AT516.

OPTIONAL HARDWARE

AT507H for Inch
AT507M for Metric
Locking Ring

Steel, chromate over zinc plating

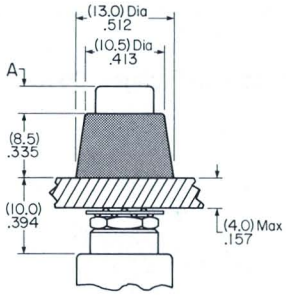


OPTIONAL MOUNTING COLLARS

AT512H for Inch
AT512M for Metric
Conical Nut

Used with .315" Dia. Cap

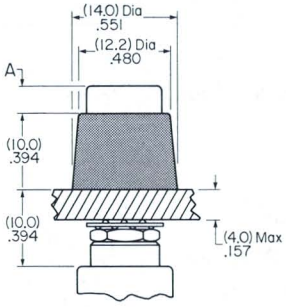
Brass with chrome plating



AT512CH for Inch
AT512CM for Metric
Conical Nut

Used with .394"Dia. Cap

Brass with chrome plating

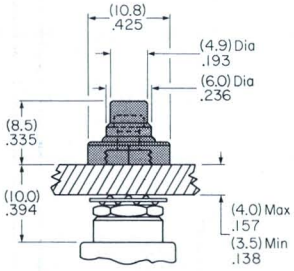


Cap height (Dimension A):
2.3mm (.091") for momentary AT413 & AT407
4.0mm (.157") for alternate AT413 & AT407
3.6mm (.142") for momentary & alternate AT443 & AT442

OPTIONAL SPLASHPROOF BOOTS

AT4041H for Inch
AT4041M for Metric
Boot for Momentary

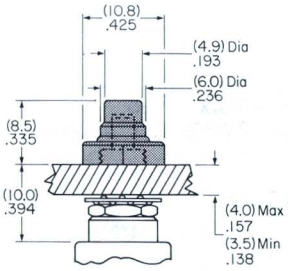
Silicone Rubber



Operating Life 100,000

AT4042H for Inch
AT4042M for Metric
Boot for Alternate

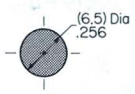
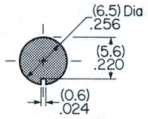
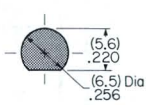
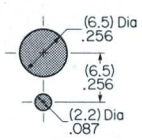
Silicone Rubber



Operating Life: 30,000

Splashproof boots fit directly over the plunger for screw-on caps. Boots for momentary devices are accompanied by a threaded adaptor which extends the length of the plunger.

PANEL CUTOUTS AND MAXIMUM EFFECTIVE PANEL THICKNESS

	Without Keyway	With Keyway	With D Flat	With Locking Ring
Panel Cutouts				
Panel Thickness with Standard Hardware	3.9mm (.154") 6.1mm (.240") for splashproof			

SOLDERING & WIRING

Soldering:

3 seconds @ 350°C
5 seconds @ 270°C

Wiring:

Solder lug terminals have .043" X .079" oblong holes which accommodate 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

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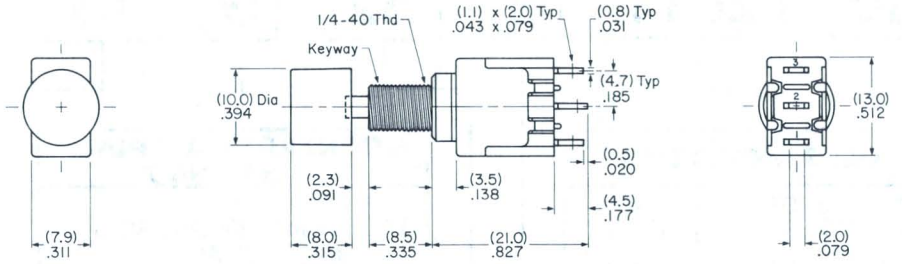
NKK SERIES M PUSHBUTTON SWITCHES

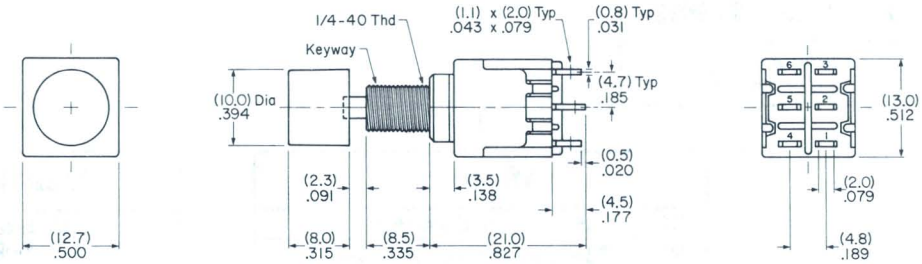
MOMENTARY & ALTERNATE/1-4 POLE/BUSHING MOUNT

Solder Lug/Single Pole



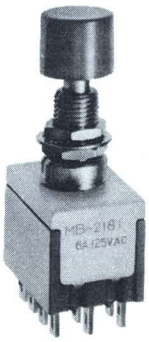
MB2011SS1WO1-CC Model Shown

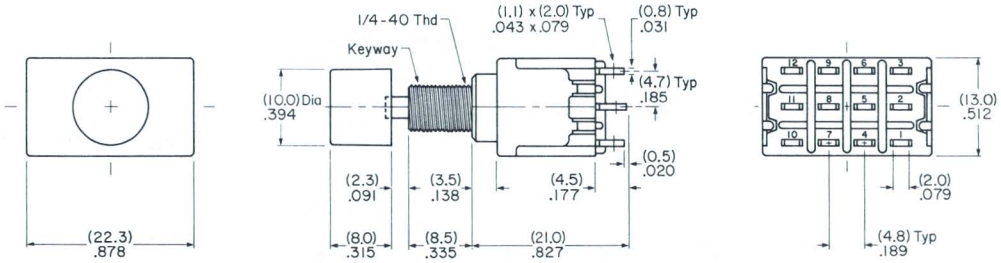
Solder Lug/Double Pole



MB2061SS1WO1-CC Model Shown

Solder Lug/Four Pole





MB2181SS1W01-CC Model Shown

NKK SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/BRACKETED & ANGLE PC

TYPICAL BRACKETED SWITCH ORDERING EXAMPLE

MB	2011	S	S2	G	13	—	C	C

POLES & CIRCUITS

2011	SPDT	ON	(ON)
2065	SPDT	ON	ON
2061	DPDT	ON	(ON)
2085	DPDT	ON	ON
2181	4PDT	ON	(ON)
2185	4PDT	ON	ON

( ) = Momentary

4 pole not for use with right angle terminals

CONTACT MATERIAL & RATINGS

W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA maximum @ 28V AC/DC maximum
G	Gold Rated 0.4VA maximum @ 28V AC/DC maximum

CAPS

B	.315" Dia.
C	.394" Dia.

CAP COLORS

A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

PLUNGER TYPES

S	Plunger for Screw-on Caps

BUSHINGS

S1	.335" Threaded with Keyway
S2	.335" Smooth with Keyway
A2	.200" Smooth with Keyway Used with SP momentary circuit 2011 & terminal code 31

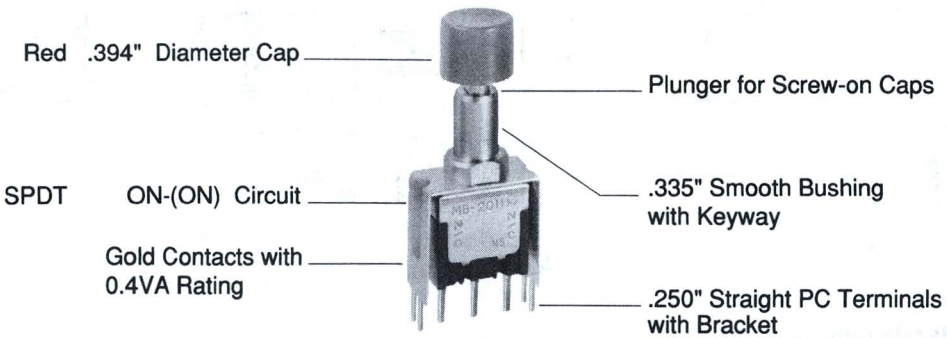
TERMINALS

13	.250" Straight PC with Bracket
30	Right Angle PC .646" Support to Terminal Available in 1-2 pole only
31	Right Angle PC .500" Support to Terminal Available in 1 pole only
40	.150" Vertical PC
45	.100" Vertical PC

IMPORTANT: Switches are supplied <u>without</u> UL & CSA marking unless specified. See Supplement for instructions.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MB2011SS2G13-CC):

SERIES M PUSHBUTTON



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NKK SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/BRACKETED & ANGLE PC

POLES & CIRCUITS

For poles and circuit information, refer to the details contained in the Poles & Circuits Chart appearing in the previous bushing mount section.

PLUNGER TYPES

S **Plunger for Screw-on Caps**

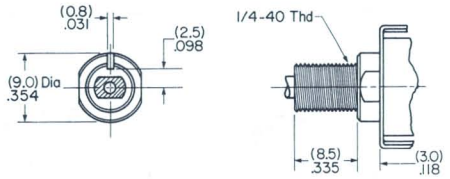
Momentary Alternate

Used with caps AT407 & AT413

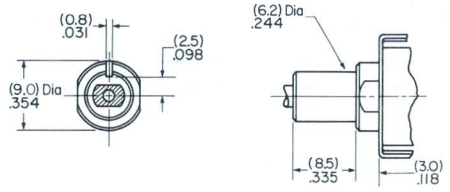
On alternate action models, after transferring circuit, the plunger returns to its original position and does not latch down.

BUSHINGS

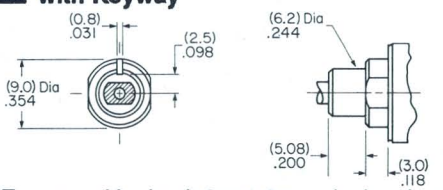
S1 **.335" Threaded with Keyway**



S2 **.335" Smooth with Keyway**



A2 **.200" Smooth with Keyway**



For use with circuit 2011 & terminal code 31

CONTACT MATERIALS & RATINGS

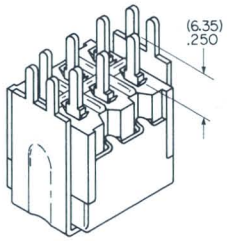
W **Silver over Silver**
Rated 6A @ 125V AC &
3A @ 250V AC

A **Gold over Silver**
Rated 6A @ 125V AC &
0.4VA maximum @ 28V AC/DC maximum

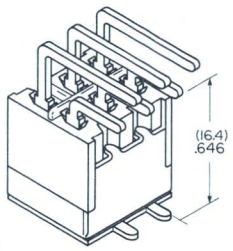
G **Gold over Brass or Copper**
Rated 0.4VA maximum @ 28V AC/DC maximum

TERMINALS

13 **.250" Straight PC with Bracket**

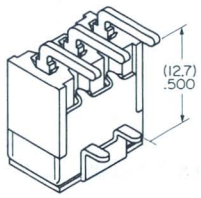


30 **Right Angle PC with .646" Support to Terminal**



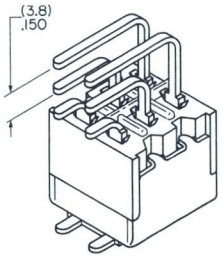
Available in 1 & 2 pole only

31 **Right Angle PC with .500" Support to Terminal**

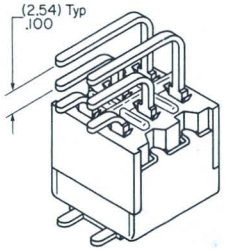


Available in 1 pole only

40 **.150" Vertical PC**



45 **.100" Vertical PC**



Full dimensioned drawings appear at the end of this pushbutton section.

SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/BRACKETED & ANGLE PC

CAPS

B **AT413**
.315" Diameter
Screw-on Cap

Polystyrene

Cap and plunger dimension:

Momentary Alternate

C **AT407**
.394" Diameter
Screw-on Cap

Polystyrene

Cap and plunger dimension:

Momentary Alternate

Colors Available:

A Black **B** White **C** Red **E** Yellow **F** Green
G Blue **H** Gray

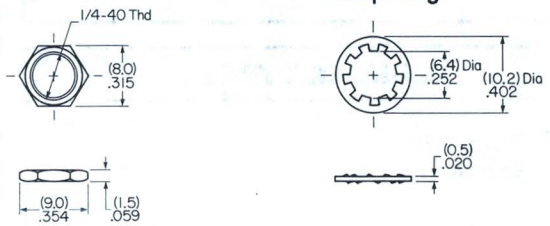
HARDWARE

AT513H for Inch Hex Nut

Brass, nickel plated

AT509 Lockwasher

Steel, chromate over zinc plating



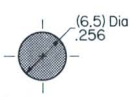
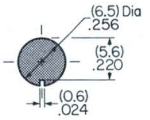
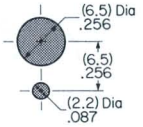
Two AT513H Hex Nuts and one AT509 Lockwasher are supplied with each switch ordered with a threaded bushing. The optional locking ring, AT507, appears in the hardware section at the end of this catalog.

SOLDERING

Soldering time and temperature limits:

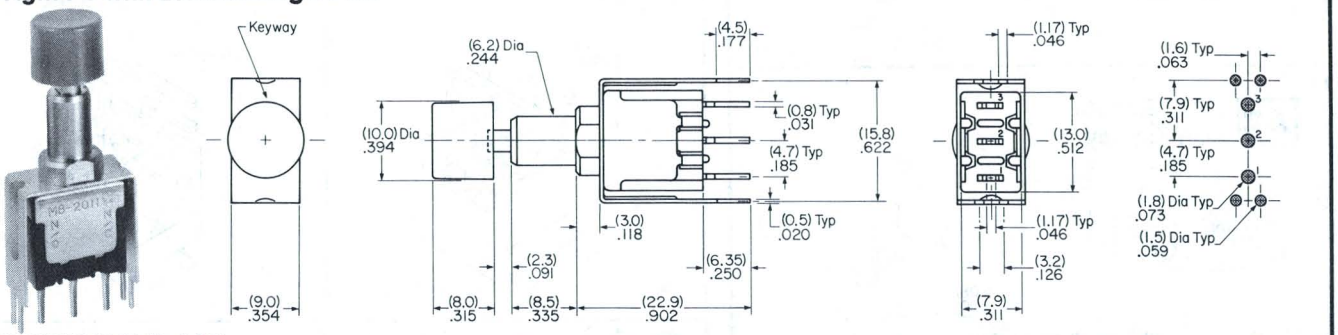
3 seconds at 350°C 5 seconds at 270°C

PANEL CUTOUTS & PANEL THICKNESS

Without Keyway	With Keyway	With Locking Ring
		

Maximum Effective Panel Thickness with Standard Hardware: 3.9mm (.154")

Straight PC with Bracket/Single Pole



MB2011SS2G13-CC Model Shown

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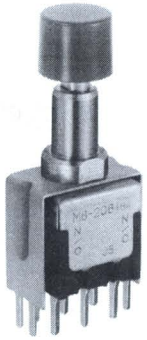
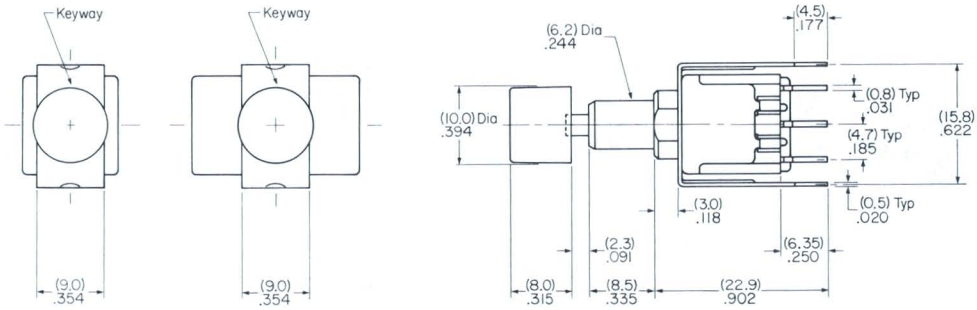
NKK SERIES M PUSHBUTTON SWITCHES

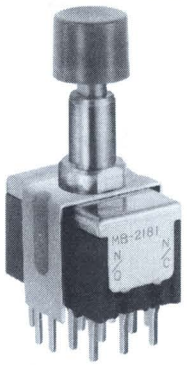
MOMENTARY & ALTERNATE/BRACKETED & ANGLE PC

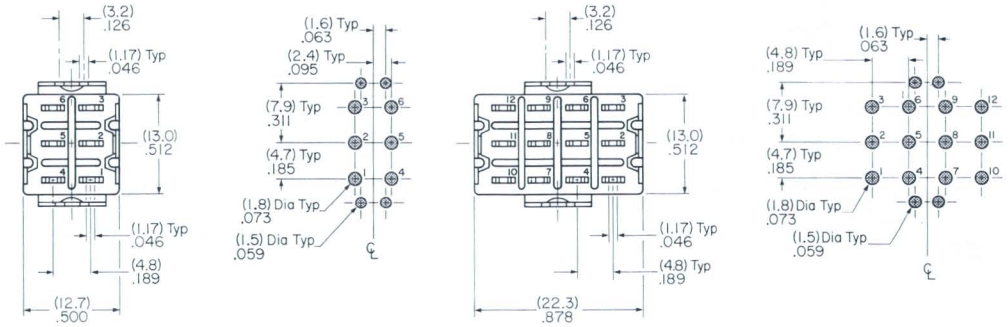
Straight PC with Bracket/Double & Four Pole





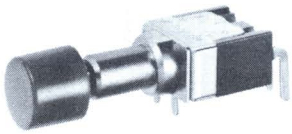
MB2061SS2G13-CC Model Shown

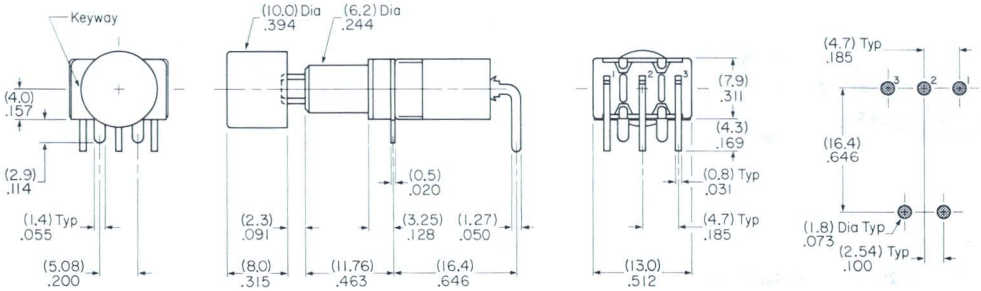




MB2181SS2G13-CC Model Shown

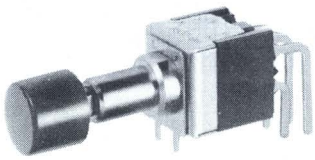
Right Angle PC with .646" Support to Terminal/Single Pole

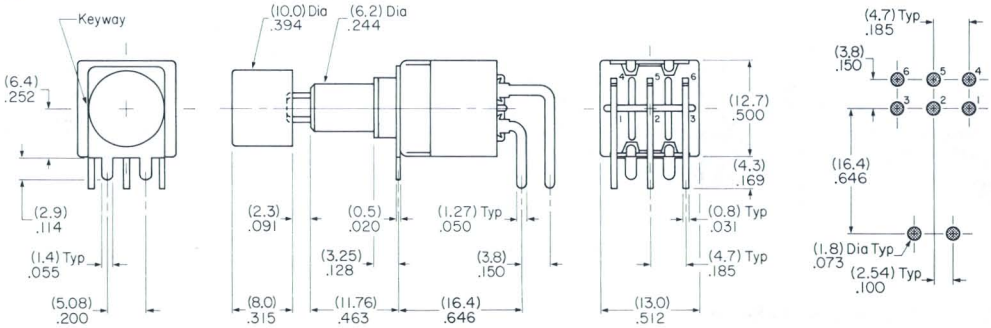




MB2011SS2G30-CC Model Shown

Right Angle PC with .646" Support to Terminal/Double Pole



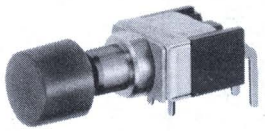


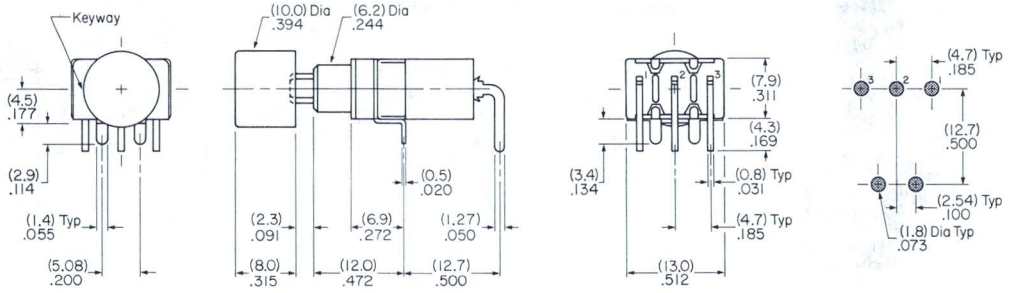
MB2061SS2G30-CC Model Shown

NKK SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/BRACKETED & ANGLE PC

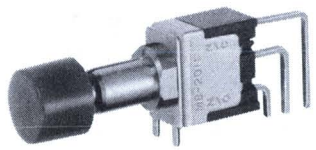
Right Angle PC with .500" Support to Terminal/Single Pole

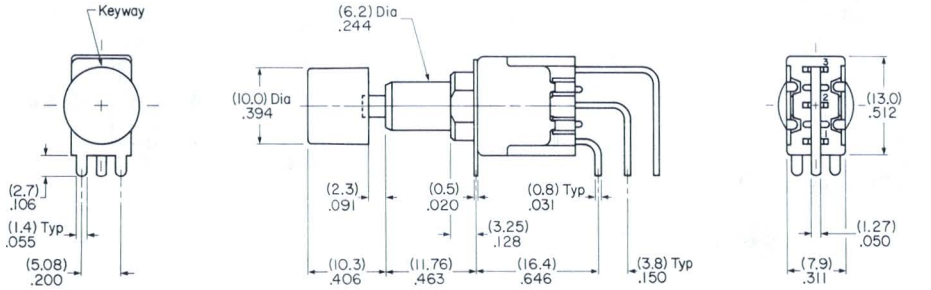




MB2011SA2G31-CC Model Shown

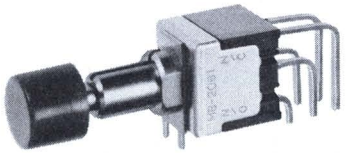
.150" Vertical PC/Single Pole

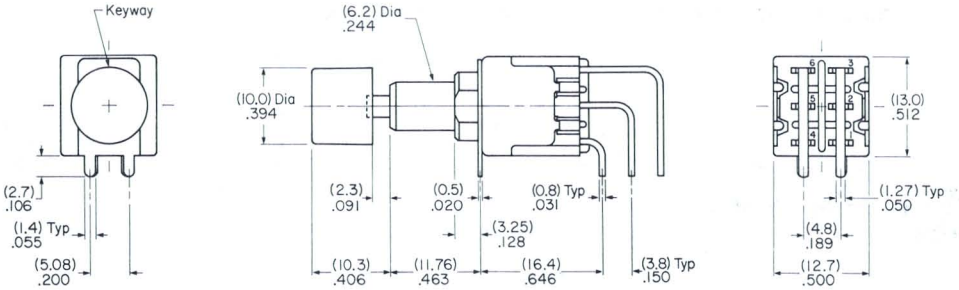




MB2011SS2G40-CC Model Shown

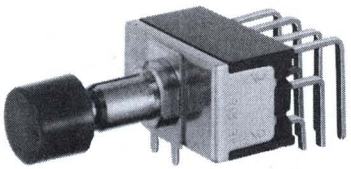
.150" Vertical PC/Double Pole

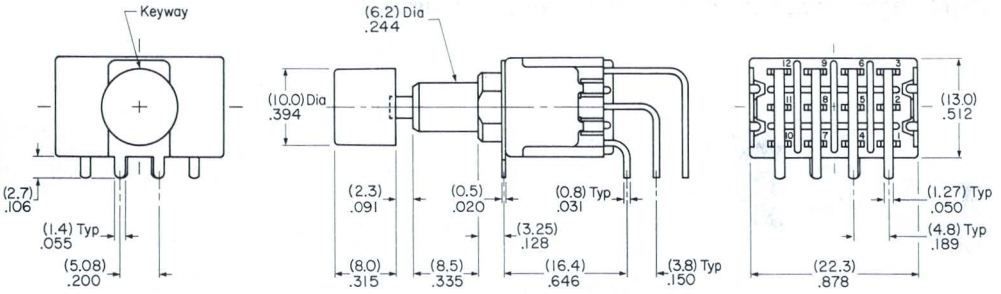




MB2061SS2G40-CC Model Shown

.150" Vertical PC/Four Pole





MB2181SS2G40-CC Model Shown

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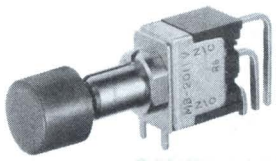
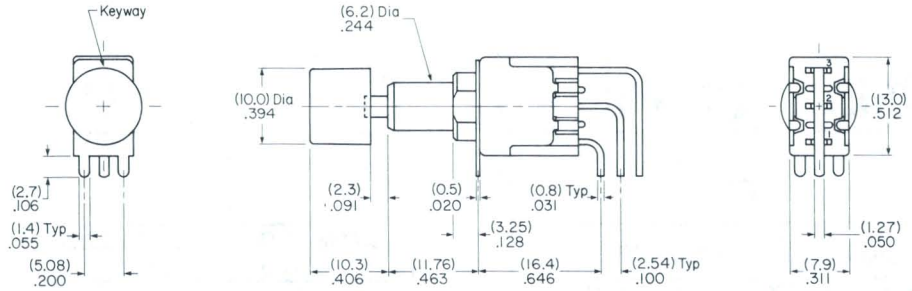
NKK SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/BRACKETED & ANGLE PC

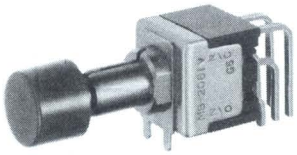
.100" Vertical PC/Single Pole

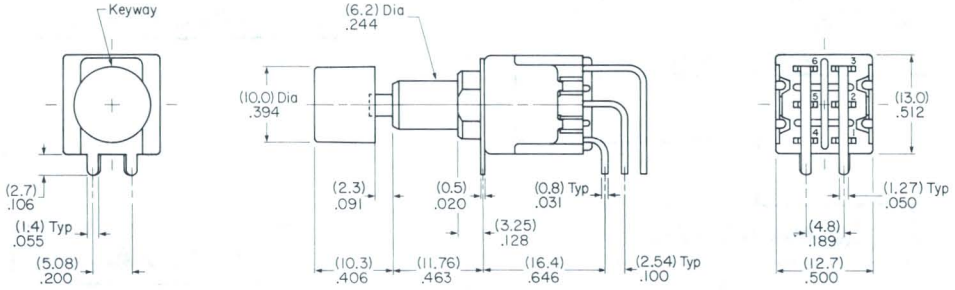




MB2011SS2G45-CC Model Shown

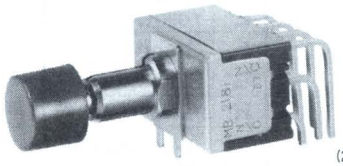
.100" Vertical PC/Double Pole

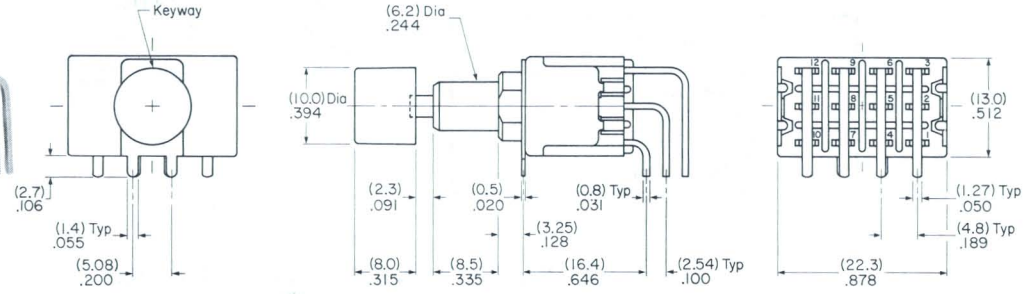




MB2061SS2G45-CC Model Shown

.100" Vertical PC/Four Pole

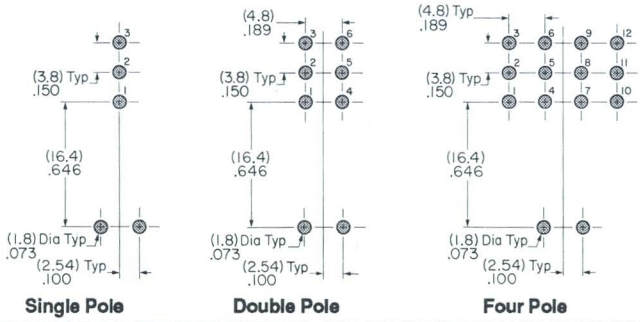




MB2181SS2G45-CC Model Shown

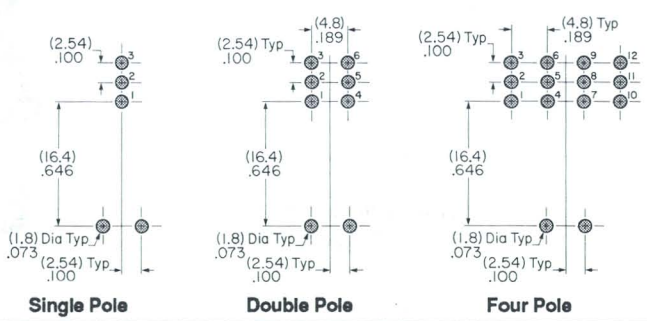
PC FOOTPRINTS

.150" VERTICAL



Single Pole | Double Pole | Four Pole

.100" VERTICAL



Single Pole | Double Pole | Four Pole

SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/1-4 POLE/LARGE BUSHING

TYPICAL LARGE BUSHING SWITCH ORDERING EXAMPLE

MB 2011 S B1 W 01 – D C

POLES & CIRCUITS

2011	SPDT	ON	(ON)
2065	SPDT	ON	ON
2061	DPDT	ON	(ON)
2085	DPDT	ON	ON
2181	4PDT	ON	(ON)
2185	4PDT	ON	ON

( ) = Momentary

CONTACT MATERIALS & RATINGS

W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
G	Gold Rated 0.4VA maximum @ 28V AC/DC maximum

CAPS

B	.315" Dia.
C	.394" Dia.
D	.520" Dia.
E	.748" Dia.

PLUNGER TYPES

S	Plunger for Screw-on Caps

BUSHINGS

B1	Large .472" Metric Threaded with Keyway
B3	Large .472" Threaded Splashproof w/D Flat

TERMINALS

01	Solder Lug
02	Quick Connect
03	.250" Straight PC
05	.425" Wirewrap
06	.750" Wirewrap
07	.964" Wirewrap
08	1.062" Wirewrap

CAP COLORS

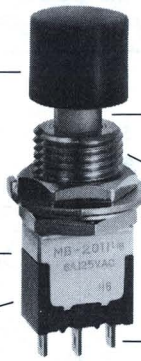
A	Black
B	White
C	Red
D	Orange Used with cap code D only
E*	Yellow
F	Green
G*	Blue
H*	Gray

*Not available with cap code E

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MB2011SB1W01-DC):

SERIES M PUSHBUTTON

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.



Red .520" Diameter Cap

Plunger for Screw-on Caps

Large .472" Metric Threaded Bushing with Keyway

SPDT ON-(ON) Circuit

Silver Contacts with 6 Amp & 3 Amp Rating

Solder Lug Terminals

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NKK SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/1-4 POLE/LARGE BUSHING

POLES & CIRCUITS

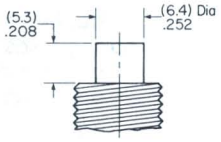
For poles and circuit information, refer to the details contained in the Poles & Circuits Chart appearing in the previous bushing mount section.

PLUNGER TYPES

S **Plunger for Screw-on Caps**

Polyacetal for B1 Bushing
Metal for B3 Bushing

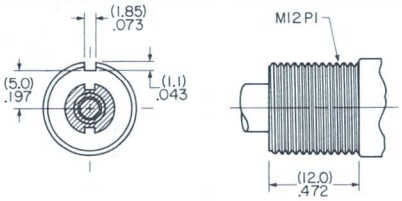
On alternate action models, after transferring circuit, the plunger returns to its original position and does not latch down.



BUSHING

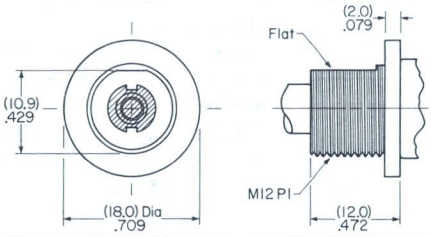
B1

Large .472" Metric Threaded with Keyway



B3

Large .472" Threaded Splashproof with D Flat



CONTACT MATERIALS & RATINGS

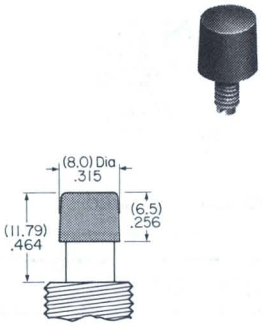
W **Silver over Silver Rated 6A @ 125V AC & 3A @ 250V AC**

G **Gold over Brass or Copper Rated 0.4VA max @ 28V AC/DC max**

CAPS

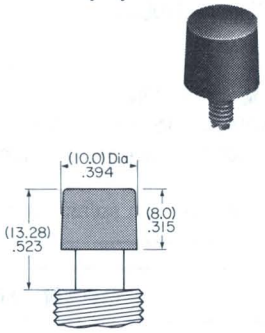
B **AT078 .315" Dia. Cap**

Polystyrene



C **AT079 .394" Dia. Cap**

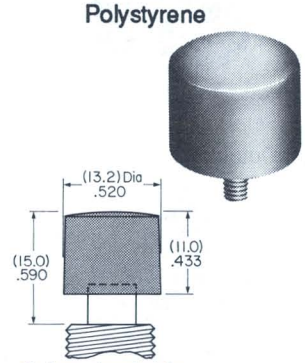
Polystyrene



Colors Available: A B C E F G H

D **AT414 .520" Dia. Cap**

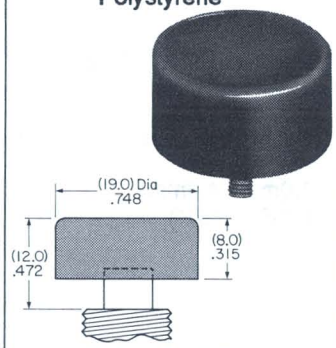
Polystyrene



Colors Available:
A B C D E F G H

E **AT412 .748" Dia. Cap**

Polystyrene



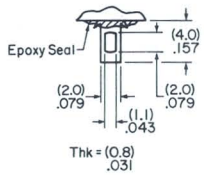
Colors Available:
A B C F

Color Codes:

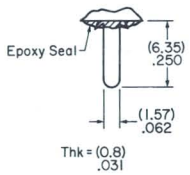
A Black **B** White **C** Red **D** Orange **E** Yellow
F Green **G** Blue **H** Gray

TERMINALS

01 **Solder Lug**

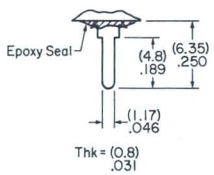


02 **.062" Wide Quick Connect**



Corresponds to AMP #60900-1 receptacle

03 **.250" Straight PC**



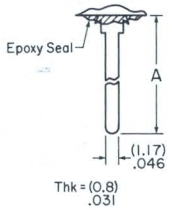
Wirewrap

05 **.425" (10.8mm)**

06 **.750" (19.05mm)**

07 **.964" (24.5mm)**

08 **1.062" (27.0mm)**



Dimension A = wirewrap terminal lengths as shown beside code boxes.

NKK SERIES M PUSHBUTTON SWITCHES

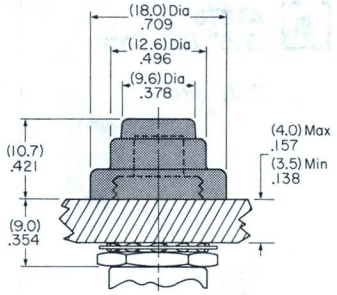
MOMENTARY & ALTERNATE/1-4 POLE/LARGE BUSHING

OPTIONAL SPLASHPROOF BOOT

AT4043
Splashproof Boot

Silicone Rubber

Operating Life:
100,000 for momentary
30,000 for alternate action



When using a splashproof boot, no cap is required.

SOLDERING & WIRING

Soldering:

3 seconds @ 350°C

5 seconds @ 270°C

Wiring:

Solder lug terminals have .043" X .079" oblong holes which accommodate 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

OPTIONAL MOUNTER

AT528
Snap-in Mounter

Fiberglass reinforced nylon

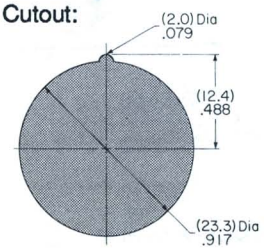
Black only available

Used with .748" diameter cap only

Panel Thickness:

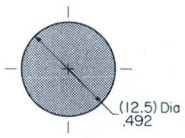
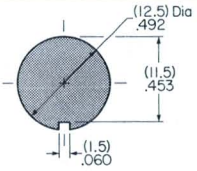
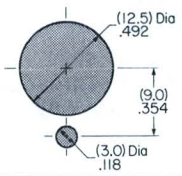
1.0mm - 4.0mm
(.039" - .157")

Panel Cutout:



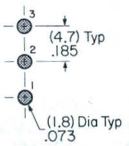
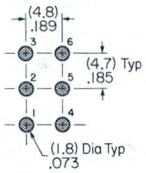
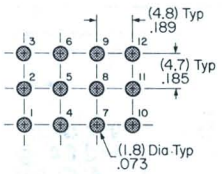
The mounter may be ordered assembled to the switch by entering "AT528" immediately after the switch part number. Mounters may also be ordered separately.

PANEL CUTOUT & PANEL THICKNESS

Without Keyway	With Keyway	With Locking Ring
		

Effective Panel Thickness with Standard Hardware: 5.5mm (.217") maximum

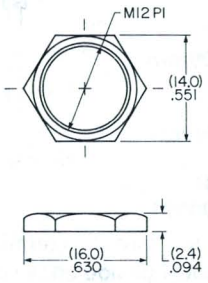
PC BOARD MOUNTING

Single Pole	Double Pole	Four Pole
		

STANDARD MOUNTING HARDWARE PROVIDED WITH SWITCHES

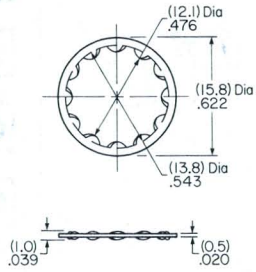
AT503
Hex Nut

Brass with chrome plating



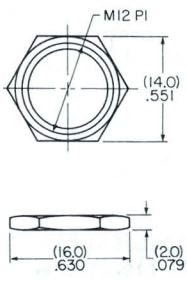
AT508
Lockwasher

Steel with zinc plating



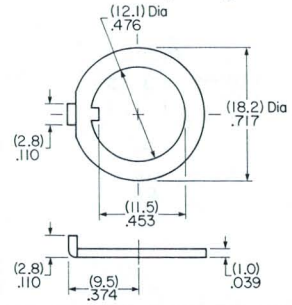
AT527M for Metric
Hex Nut

Steel with nickel plating



AT506
Locking Ring

Steel with zinc plating



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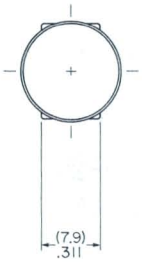
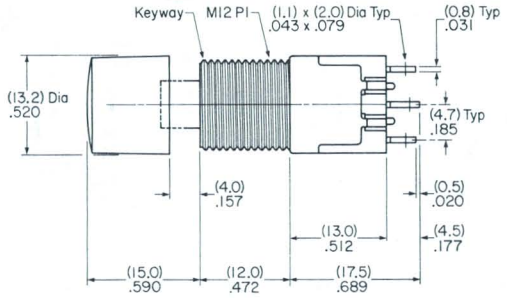
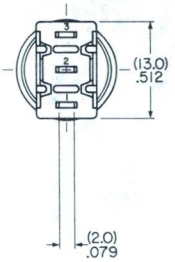
SERIES M PUSHBUTTON SWITCHES

MOMENTARY & ALTERNATE/1-4 POLE/LARGE BUSHING

Large Bushing/Solder Lug/Single Pole

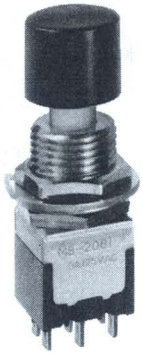


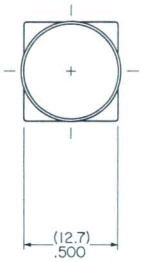


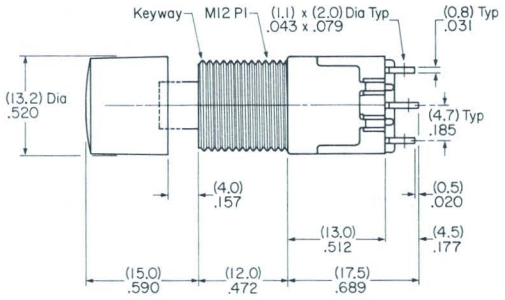


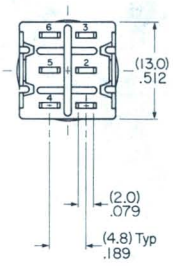
MB2011SB1WO1-DC Model Shown

Large Bushing/Solder Lug/Double Pole



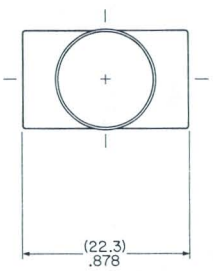


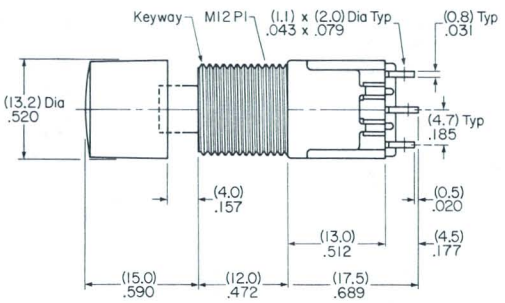


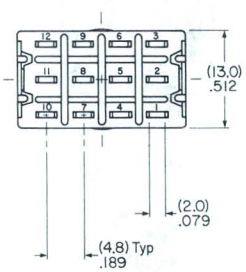


MB2061SB1WO1-DC Model Shown

Large Bushing/Solder Lug/Four Pole





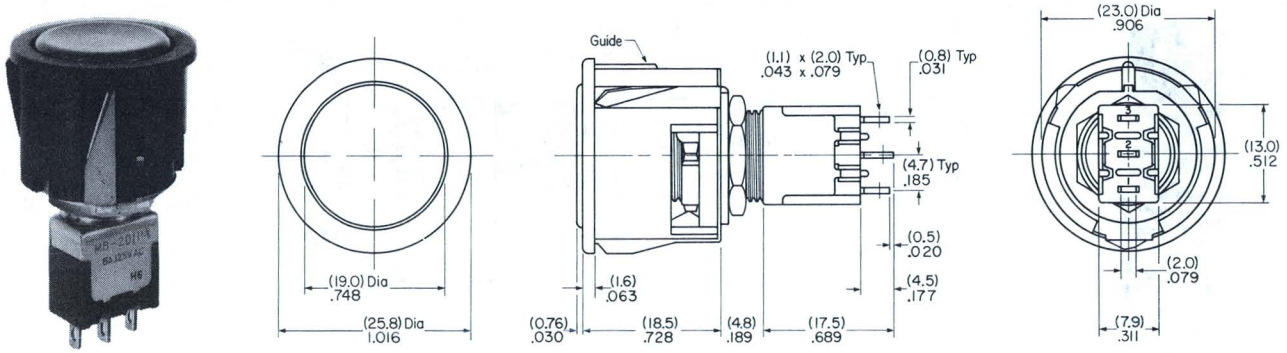


MB2181SB1WO1-DC Model Shown

NKK SERIES M PUSHBUTTON SWITCHES

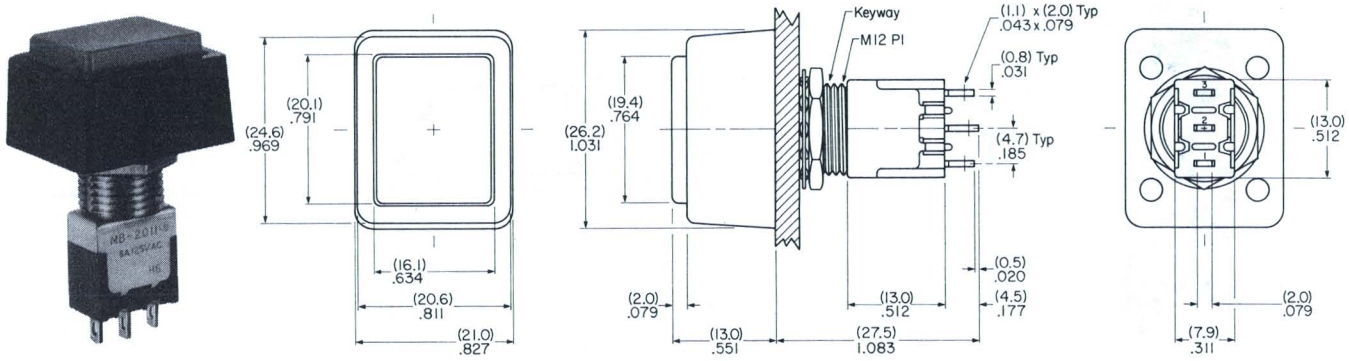
MOMENTARY & ALTERNATE/1-4 POLE/LARGE BUSHING

Large Bushing/Solder Lug/Single Pole with Snap-in Mounter



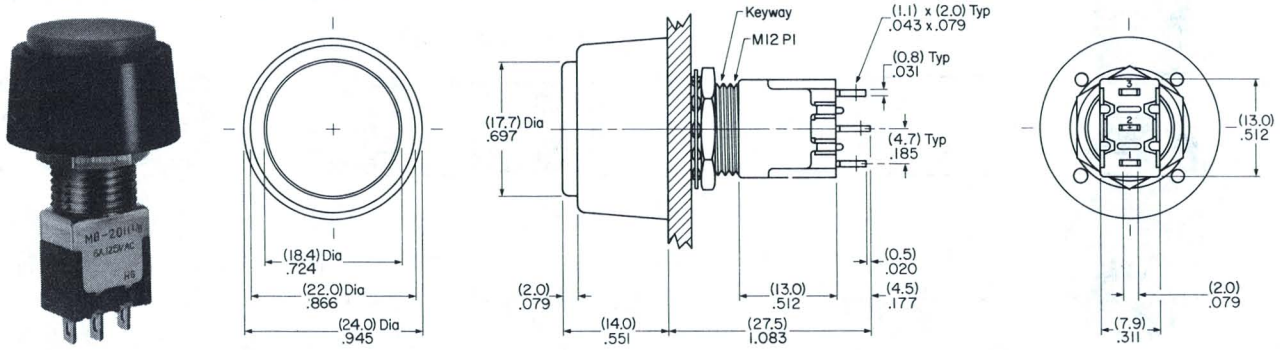
Model shown is MB2011SB1W01 with optional Snap-in Mounter **AT528** and .748" Diameter Cap **AT412.**

Large Bushing/Solder Lug/Single Pole with Rectangular Shroud



Model shown is MB2011SB1W01 with optional Rectangular Shroud **AT453**, Shroud Insert **AT452** and Screw Adaptor for Insert **AT080**. When assembling, use only **AT508** and **AT527M** of the standard hardware provided. For material, color availability and dimensions of these accessories, see the Accessories Section at the end of this catalog.

Large Bushing/Solder Lug/Single Pole with Round Shroud



Model shown is MB2011SB1W01 with optional Round Shroud **AT455**, Shroud Insert **AT454** and Screw Adaptor for Insert **AT080**. When assembling, use only **AT508** and **AT527M** of the standard hardware provided. For material, color availability and dimensions of these accessories, see the Accessories Section at the end of this catalog.

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SERIES M PUSHBUTTON SWITCHES

SUBMINIATURE/SNAP ACTION/MOMENTARY/1 & 2 POLE

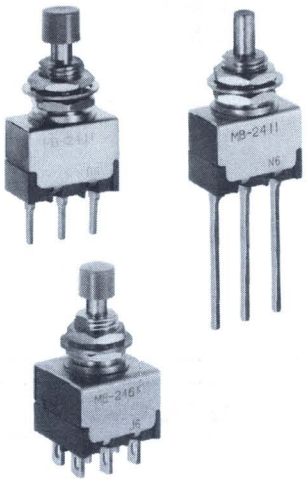
M SERIES PUSHBUTTONS - MB2400

MB2400 pushbuttons feature many of the fine characteristics found in the other M Series devices, high torque bushings, stainless steel frame, prominent external insulating barriers, epoxy sealed terminals, internal o-ring for splashproofing, longer center solder lug terminals, and 1500V dielectric strength. In addition, the snap-action contact mechanism results in smooth, light touch actuation. These features exemplify the quality for which NKK is known.

These double throw, momentary devices are available in either single or double pole. A variety of bushings, mounting brackets, terminals and ratings provide users with a wide range of options to meet their specific needs. Accessories, such as: a conical nut, decorative dress nuts and bezels with LEDs may be added to the basic switch to enhance front panel appearance.

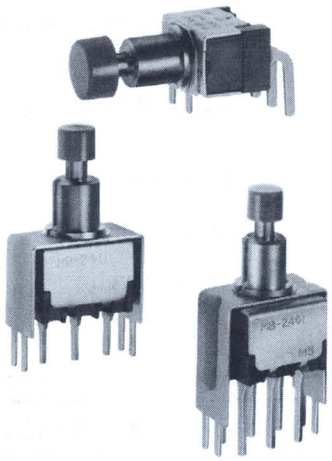
This series is divided into three sections by mounting type: Bushing Mount, Bracketed & Angle PC Mount and Snap-in Mount. In the front of each section, a Typical Ordering Example outlines the different options available for that mounting type. Detail pages following each ordering example provide additional information regarding the options outlined and accessories available.

Bushing Mount
Pages M69 - M74



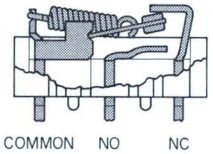
Snap-in Mount
Pages M80 - M82

Bracketed & Angle PC Mount
Pages M75 - M79



SNAP-ACTING MECHANISM

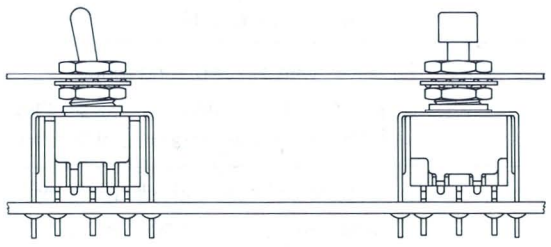
The MB2400 pushbutton is a snap-action device usable where short travel and sensitivity of actuation are required. The light touch, snap-acting contact mechanism gives these switches an extremely smooth feel and provides audible feedback upon operation.



The contact mechanism is double throw with a normally closed and a normally open contact. This mechanism also provides longer electrical life.

UNIFORM PCB MOUNTING

Straight PC, with and without brackets, right angle PC and vertical PC models have been especially designed for compatibility with M Series toggles. Uniformity of switch bodies, .280" & .350" bushings and footprints for both toggles and pushbuttons make these devices ideal for mounting next to one another. This feature simplifies design of panel layout, provides convenient mounting of devices with different actuators and facilitates interchangeability of PC boards.



NKK SERIES M PUSHBUTTON SWITCHES

SUBMINIATURE/SNAP ACTION/MOMENTARY/1 & 2 POLE

GENERAL SPECIFICATIONS

Electrical Capacity: **(Resistive Load)**	3A @ 125V AC 0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	20 milliohms maximum for silver 30 milliohms maximum for gold
Insulation Resistance:	1,000 megohm minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	200,000 operations minimum
Electrical Life:	25,000 operations minimum for silver 100,000 operations minimum for gold
Ambient Temp Range:	-15°C through +70°C (+5°F through +158°F) Optional low temperature lubricant available
Nominal Operating Force:	Single Pole 250 grams Double Pole 400 grams
Pretravel:	0.7mm (.027")
Overtravel:	0.3mm (.012")
Total Travel:	1.0mm (.039")

MATERIALS & FINISHES

Plunger	Brass with nickel plating
Bushing	Brass with nickel plating
O-ring	Nitrile butadiene rubber
Frame	Stainless steel
Base	Diallylphthalate resin
Case	Polyamide
Movable Contactor	Phosphor bronze with silver or gold plating
Movable Contacts	Silver alloy (code W); silver alloy with gold plating over nickel (code A); or copper with gold plating over nickel (code G)
Stationary Contacts	Silver with silver plating (code W); silver with gold plating over nickel (code A); or copper or brass with gold plating over nickel (code G)
Terminals	Copper or brass with silver plating; copper or brass with gold plating over nickel

UL & CSA

All models are recognized

by

Underwriters Laboratories Inc.

and certified by

Canadian Standards Association

for

3A @ 125V AC
or
0.4VA maximum @ 28V maximum AC/DC

UL File No. E44145

CSA File Nos. LR 23535 and LR56017

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NKK SERIES M PUSHBUTTON SWITCHES

SNAP ACTION/MOMENTARY/1 & 2 POLE/BUSHING MOUNT

TYPICAL BUSHING MOUNT SWITCH ORDERING EXAMPLE

MB24 11 E1 W 01 — F C

POLES & CIRCUITS			
11	SPDT	ON	(ON)
61	DPDT	ON	(ON)
( ) = Momentary			

CONTACT MATERIALS & RATINGS	
W	Silver Rated 3A @ 125V AC
A	Gold over Silver Rated 3A @ 125V AC & 0.4VA maximum @ 28V AC/DC maximum
G	Gold Rated 0.4VA maximum @ 28V AC/DC maximum

CAPS	
F	.201" Dia.
H	.295" Dia.

BUSHINGS	
E1	.285" Threaded with D Flat
E2	.285" Smooth with D Flat
S1	.350" Threaded with Keyway
S2	.350" Smooth with Keyway
S4	.350" Threaded Metric with Keyway
A1	.280" Threaded with Keyway
A2	.280" Smooth with Keyway
T1	.410" Threaded with Keyway

TERMINALS	
01	Solder Lug
03	.250" Straight PC
05	.425" Wirewrap
06	.750" Wirewrap
07	.964" Wirewrap
08	1.062" Wirewrap

CAP COLORS	
A	Black
B	White
C	Red

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

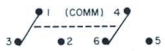
DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MB2411E1W01-FC):

SERIES M PUSHBUTTON

SERIES M PUSHBUTTON SWITCHES

SNAP ACTION/MOMENTARY/1 & 2 POLE/BUSHING MOUNT

POLES & CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary — Normal (Keyway)	Down
SPDT	MB2411	ON	(ON)
CONNECTED TERMINIALS		1-3	1-2
SCHEMATIC			
DPDT	MB2461	ON	(ON)
CONNECTED TERMINALS		1-3 4-6	1-2 4-5
SCHEMATIC			

Terminal numbers are not actually on the switch.

CONTACT MATERIALS & RATINGS

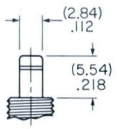
W Silver over Silver
Rated 3A @ 125V AC

A Gold over Silver
Rated 3A @ 125V AC &
0.4VA maximum @ 28V AC/DC maximum

G Gold over Brass or Copper
Rated 0.4VA maximum @ 28V
AC/DC maximum

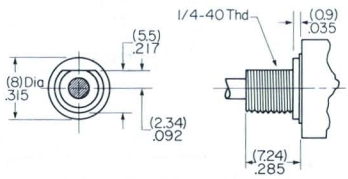
PLUNGER

Plunger selection is not required for MB2400 pushbuttons. The plunger can be used with or without a cap.

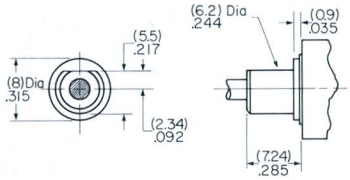


BUSHINGS

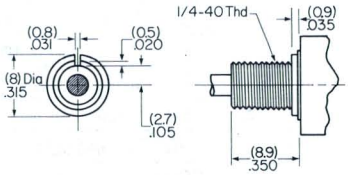
E1 .285" Threaded with D Flat



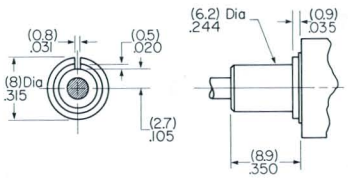
E2 .285" Smooth with D Flat



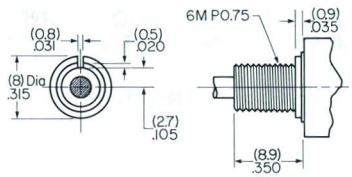
S1 .350" Threaded with Keyway



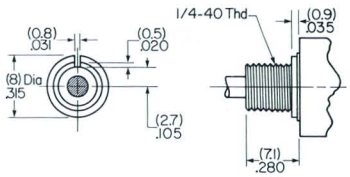
S2 .350" Smooth with Keyway



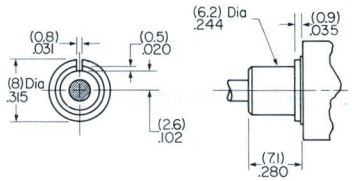
S4 .350" Threaded Metric with Keyway



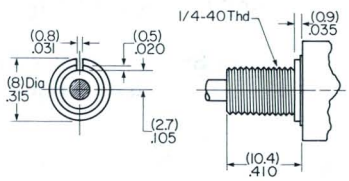
A1 .280" Threaded with Keyway



A2 .280" Smooth with Keyway



T1 .410" Threaded with Keyway



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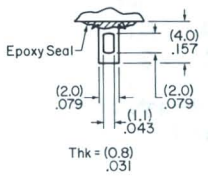
NKK SERIES M PUSHBUTTON SWITCHES

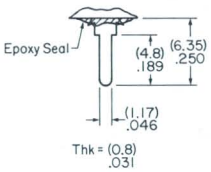
SNAP ACTION/MOMENTARY/1 & 2 POLE/BUSHING MOUNT

TERMINALS

01 Solder Lug



03 .250" Straight PC



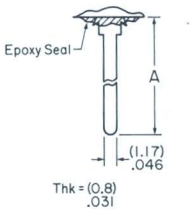
Wirewrap

05 .425" (10.8mm)

06 .750" (19.05mm)

07 .964" (24.5mm)

08 1.062" (27.0mm)



Dimension A = wirewrap terminal lengths as shown beside code boxes.

CAPS

F AT475 .201" Diameter Cap

Polycarbonate

H AT496 .295" Diameter Cap

Polycarbonate

Colors Available: **A** Black **B** White **C** Red

DECORATIVE HARDWARE

Decorative hardware is available for MB2400 pushbuttons. Conical nut, AT512, two sizes of dress nuts, AT532 or AT533, and a knurled face nut, AT501, are available in either inch or metric dimensions. Detailed illustrations of this hardware is included in the hardware section at the end of this catalog.

SOLDERING & WIRING

Soldering:

3 seconds @ 350°C 5 seconds @ 270°

Wiring:

Solder lug terminals have .043" X .079" oblong holes which accommodate 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

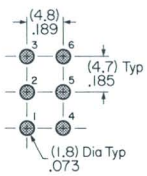
PANEL THICKNESS

Panel Thickness with Standard Hardware:

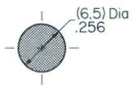
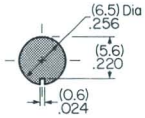
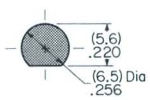
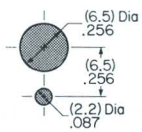
For .285" Bushing: 1.74mm (.068") maximum

For .350" Bushing: 3.40mm (.134") maximum

PC BOARD MOUNTING

Single Pole	Double Pole
	

PANEL CUTOUTS

Without Keyway	With Keyway	With D Flat	With Locking Ring
			

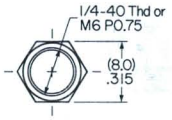
NKK SERIES M PUSHBUTTON SWITCHES

SNAP ACTION/MOMENTARY/1 & 2 POLE/BUSHING MOUNT

STANDARD HARDWARE

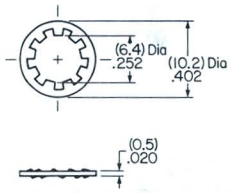
AT513H for Inch
AT513M for Metric
Hex Nut

Brass, nickel plated



AT509
Lockwasher

Steel, chromate over zinc plating

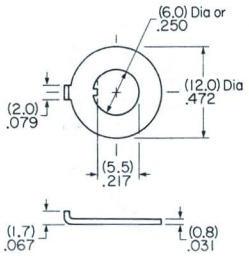


Hardware included with each switch: Two AT513 (H or M) and one AT509.

OPTIONAL HARDWARE

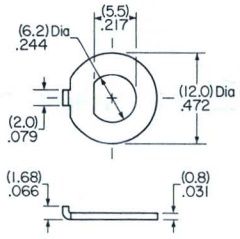
AT507H for Inch
AT507M for Metric
Locking Ring

Steel, chromate over zinc plating

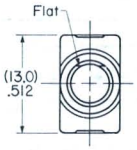


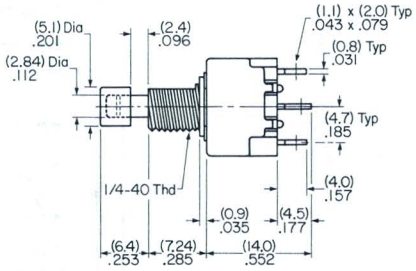
AT515
Locking Ring
for D Flat Bushing

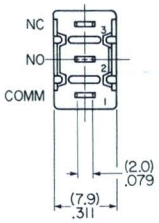
Steel, chromate over zinc plating



Solder Lug/Single Pole

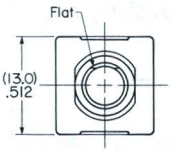


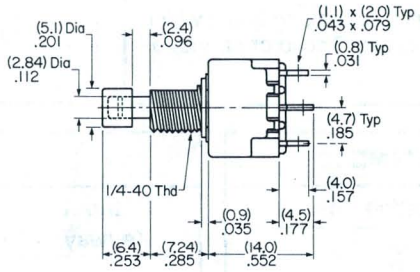


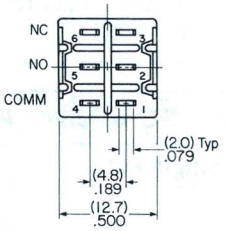


MB2411E1WO1-FC Model Shown

Solder Lug/Double Pole







MB2461E1WO1-FC Model Shown

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NKK SERIES M PUSHBUTTON SWITCHES

SNAP ACTION/MOMENTARY/BRACKETED & ANGLE PC

TYPICAL BRACKETED SWITCH ORDERING EXAMPLE

MB24 11 A2 G 13 — F C

POLES & CIRCUITS

11*	SPDT	ON	(ON)
61	DPDT	ON	(ON)
( ) = Momentary			
*Reverse circuit available with terminal code 32			

CONTACT MATERIALS & RATINGS

W	Silver Rated 3A @ 125V AC
A	Gold over Silver Rated 3A @ 125V AC & 0.4VA maximum @ 28V AC/DC maximum
G	Gold Rated 0.4VA maximum @ 28V AC/DC maximum

CAPS

F	.201" Dia.
H	.295" Dia.

CAP COLORS

A	Black
B	White
C	Red

BUSHINGS

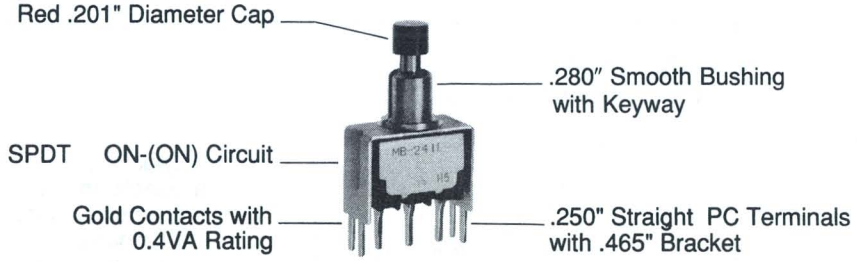
A1	.280" Threaded with Keyway
A2	.280" Smooth with Keyway
S1	.350" Threaded with Keyway
S2	.350" Smooth with Keyway
E1	.285" Threaded with D Flat
E2	.285" Smooth with D Flat
T1	.410" Threaded with Keyway
H2	.180" Smooth without Keyway Combines with bracketed straight PC terminals only

TERMINALS

	With Bracket
13	.250" Straight PC with .465" Bracket
15	.425" Straight PC with .630" Bracket
17	.964" Straight PC with 1.150" Bracket
	With Reinforced Bracket
23	.250" Straight PC with .465" Bracket
25	.425" Straight PC with .630" Bracket
26	.750" Straight PC with .953" Bracket
	With Terminal Support
30	Right Angle PC
33	Right Angle PCB Single pole & 0.4VA rating only
32	Right Angle PCB with Reverse Circuit Single pole & 0.4VA rating only
40	Vertical PC

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MB2411A2G13-FC):

SERIES M PUSHBUTTON



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

NKK SERIES M PUSHBUTTON SWITCHES

SNAP ACTION/MOMENTARY/BRACKETED & ANGLE PC

POLES & CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary — Normal (Keyway)	Down
SPDT	MB2411*	ON	(ON)
CONNECTED TERMINIALS		1-3	1-2
SCHEMATIC			
DPDT	MB2461	ON	(ON)
CONNECTED TERMINALS		1-3 4-6	1-2 4-5
SCHEMATIC			

*Reverse circuit used with terminal code 32. Terminal numbers are not on the switch.

CONTACT MATERIALS & RATINGS

W Silver over Silver
Rated 3A @ 125V AC

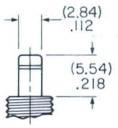
A Gold over Silver
Rated 3A @ 125V AC &
0.4VA maximum @ 28V AC/DC maximum

G Gold over Brass or Copper
Rated 0.4VA maximum @ 28V
AC/DC maximum

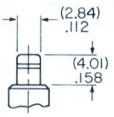
PLUNGER

Plunger selection is not required for MB2400 pushbuttons. The plunger can be used with or without a cap.

Standard Plunger

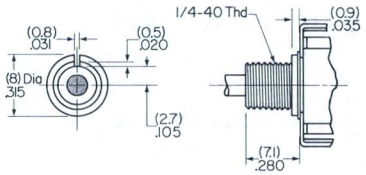


Plunger with H2 Bushing

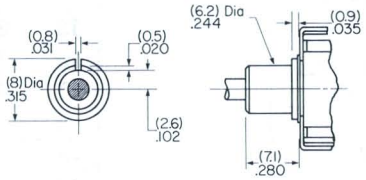


BUSHINGS

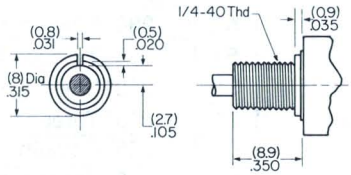
A1 .280" Threaded with Keyway



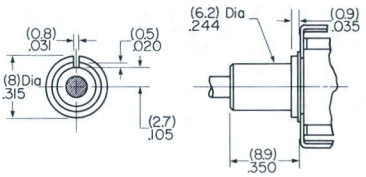
A2 .280" Smooth with Keyway



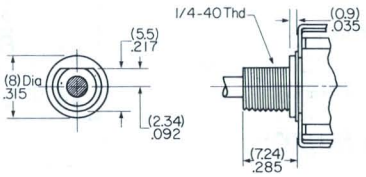
S1 .350" Threaded with Keyway



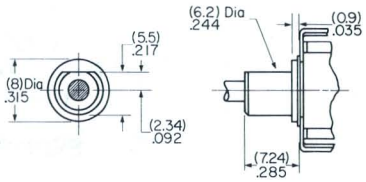
S2 .350" Smooth with Keyway



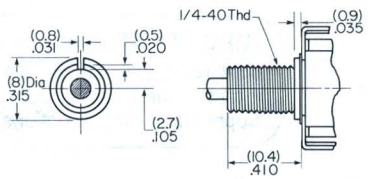
E1 .285" Threaded with D Flat



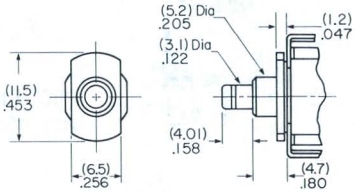
E2 .285" Smooth with D Flat



T1 .410" Threaded with Keyway



H2 .180" Smooth without Keyway



H2 bushings are available only with bracketed straight PC terminals and are supplied with a .158" long plunger.

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NKK SERIES M PUSHBUTTON SWITCHES

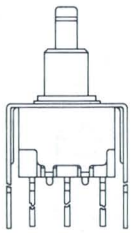
SNAP ACTION/MOMENTARY/BRACKETED & ANGLE PC

TERMINALS

13 .250" Straight PC with .465" Bracket

15 .425" Straight PC with .630" Bracket

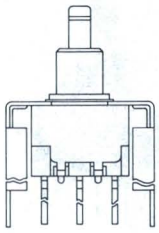
17 .964" Straight PC with 1.150" Bracket



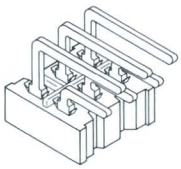
23 .250" Straight PC with .465" Reinforced Brkt.

25 .425" Straight PC with .630" Reinforced Brkt.

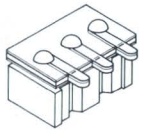
26 .750" Straight PC with .953" Reinforced Brkt.



30 Right Angle PC

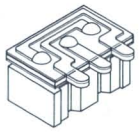


33 Right Angle PCB



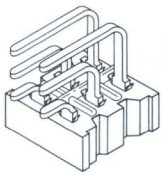
Available only in single pole with 0.4VA rating

32 Right Angle PCB with Reverse Circuit



Available only in single pole with 0.4VA rating

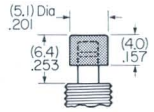
40 Vertical PC



CAPS

F AT475
.201" Diameter Cap

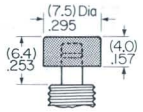
Polycarbonate



With Std. Bushing

H AT496
.295" Diameter Cap

Polycarbonate



With Std. Bushing

Colors Available:
A Black **B** White **C** Red

HARDWARE

Standard hardware included with each threaded bushing is: two hex nuts, AT513 (H or M) and one lockwasher, AT509. Optional locking rings, AT507 (H or M) and AT515 are also available. This hardware appears in the previous bushing mount section. Decorative hardware: conical nut, AT512, two sizes of dress nuts, AT532 or AT533, and a knurled face nut, AT501, are suitable for use with these switches. Detailed illustrations of this hardware is included in the hardware section.

SOLDERING

3 seconds @ 350°C

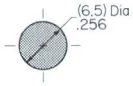
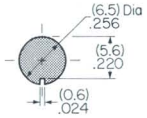
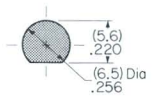
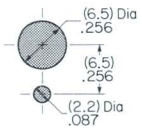
5 seconds @ 270°C

PANEL THICKNESS

With Standard Hardware:

For .280" Bushing: 1.74mm (.068") max.
For .350" Bushing: 3.40mm (.134") max.

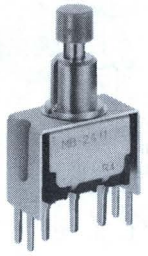
PANEL CUTOUTS

Without Keyway	With Keyway	With D Flat	With Locking Ring
			

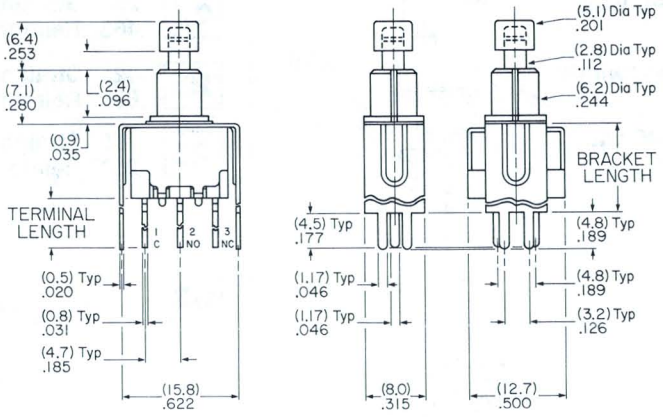
NKK SERIES M PUSHBUTTON SWITCHES

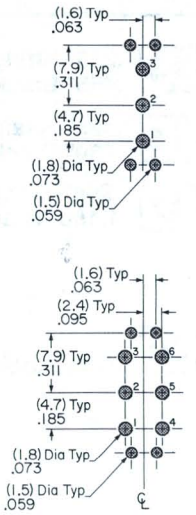
SNAP ACTION/MOMENTARY/BRACKETED & ANGLE PC

Straight PC with Bracket/Single & Double Pole



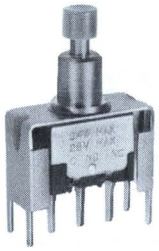
MB2411A2G13-FC Model Shown



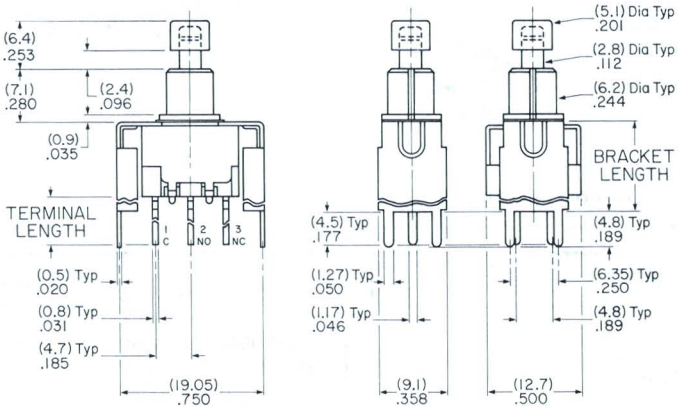


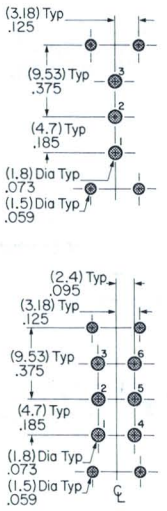
Terminal Code	Terminal Length	Bracket Length
13	.250" (6.4mm)	.465" (11.8mm)
15	.425" (10.8mm)	.630" (16.0mm)
17	.964" (25.5mm)	1.150" (29.2mm)

Straight PC with Reinforced Bracket/Single & Double Pole



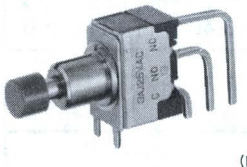
MB2411A2G23-FC Model Shown



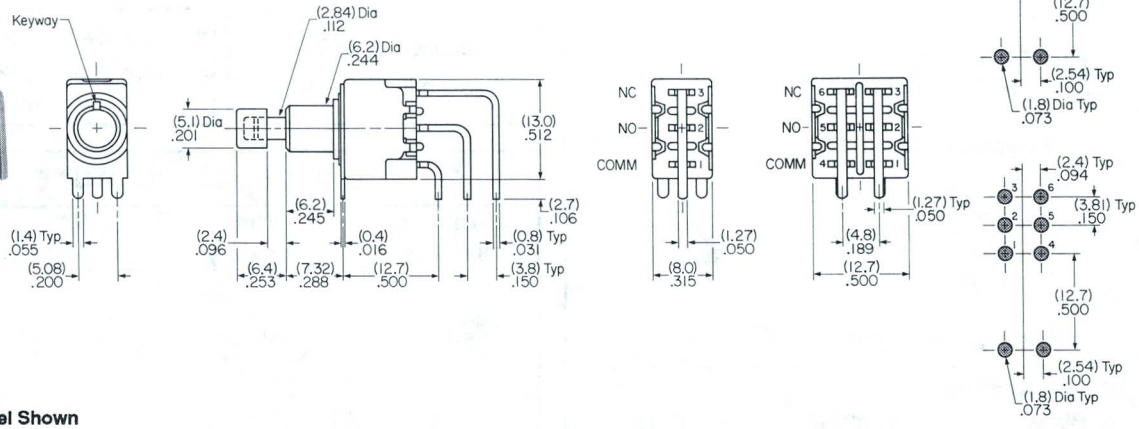


Terminal Code	Terminal Length	Bracket Length
23	.250" (6.4mm)	.465" (11.8mm)
25	.425" (10.8mm)	.630" (16.0mm)
26	.750" (19.05mm)	.953" (24.2mm)

Vertical PC/Single & Double Pole



MB2411A2G40-FC Model Shown



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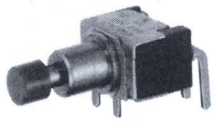
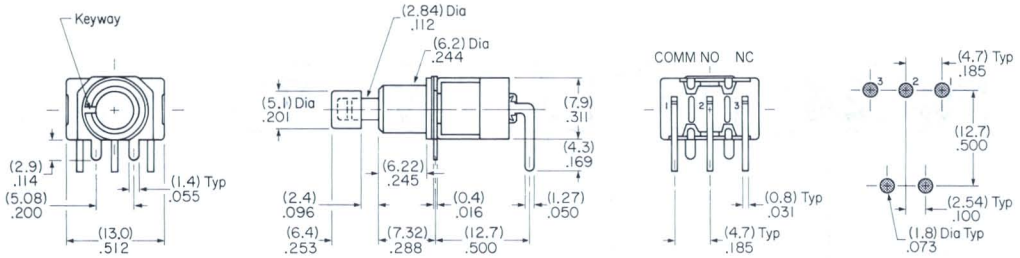
NKK SERIES M PUSHBUTTON SWITCHES

SNAP ACTION/MOMENTARY/BRACKETED & ANGLE PC

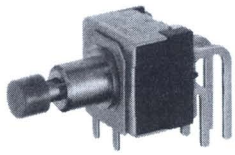
Right Angle PC/Single Pole

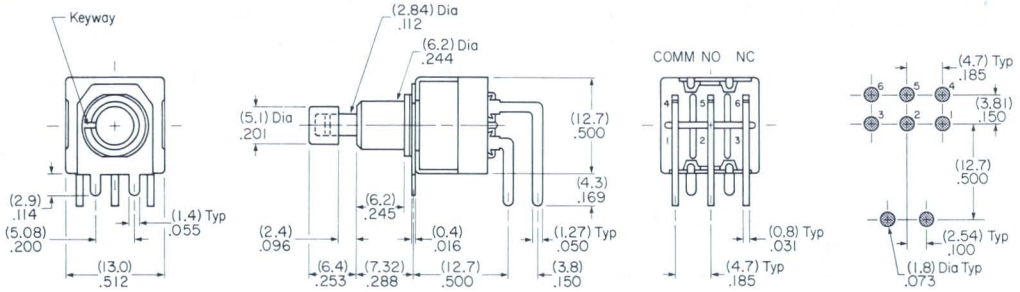




MB2411A2G30-FC Model Shown

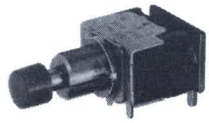
Right Angle PC/Double Pole

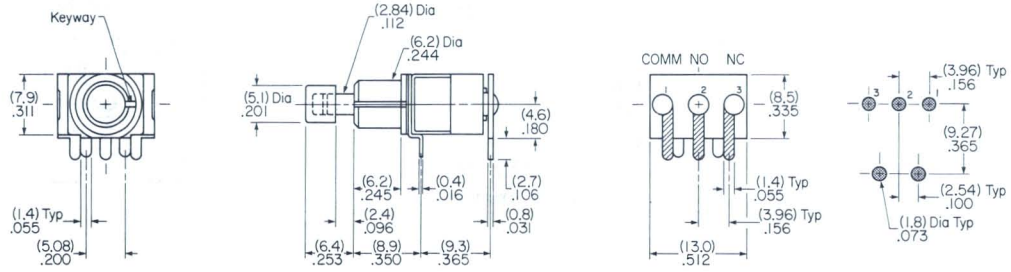




MB2461A2G30-FC Model Shown

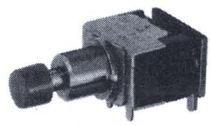
Right Angle PCB/Single Pole

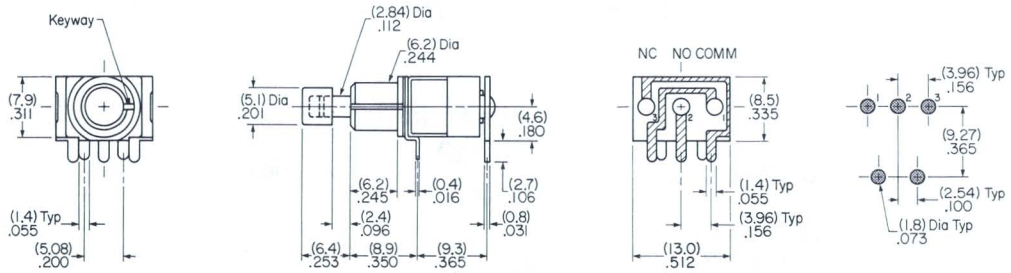




MB2411A2G33-FC Model Shown

Right Angle PCB/Single Pole/Reverse Circuit





MB2411A2G32-FC Model Shown

NKK SERIES M PUSHBUTTON SWITCHES

SNAP ACTION/MOMENTARY/1 & 2 POLE/SNAP-IN MOUNT

TYPICAL SNAP-IN SWITCH ORDERING EXAMPLE

MB24 | 11 | J | W | 01 — C — 1 | A

POLES & CIRCUITS			
11	SPDT	ON	(ON)
61	DPDT	ON	(ON)
( ) = Momentary			

MOUNTING FRAME	
J	Snap-in Frame

CONTACT MATERIALS & RATINGS	
W	Silver Rated 3A @ 125V AC
A	Gold over Silver Rated 3A @ 125V AC & 0.4VA maximum @ 28V AC/DC maximum
G	Gold Rated 0.4VA maximum @ 28V AC/DC maximum

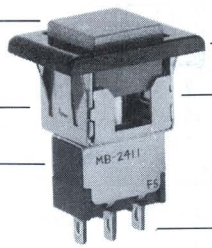
TERMINALS	
01	Solder Lug
03	.250" Straight PC
05	.425" Wirewrap
06	.750" Wirewrap
07	.964" Wirewrap
08	1.062" Wirewrap

CAP & CAP COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

BEZEL & BEZEL COLORS	
1A	Black
1B	White
1C	Red
1E	Yellow
1F	Green
1G	Blue
1H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MB2411JW01-C-1A):

SERIES M PUSHBUTTON



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

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NKK SERIES M PUSHBUTTON SWITCHES

SNAP ACTION/MOMENTARY/1 & 2 POLE/SNAP-IN MOUNT

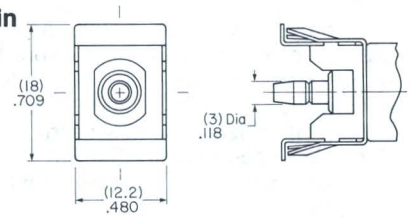
POLES & CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary — Normal (Keyway)	Down
SPDT	MB2411	ON	(ON)
CONNECTED TERMINALS		1-3	1-2
SCHEMATIC			
DPDT	MB2461	ON	(ON)
CONNECTED TERMINALS		1-3 4-6	1-2 4-5
SCHEMATIC			

Terminal numbers are not actually on the switch.

MOUNTING FRAME

J Snap-in Frame



CONTACT MATERIALS & RATINGS

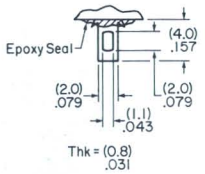
W Silver over Silver
Rated 3A @ 125V AC

A Gold over Silver
Rated 3A @ 125V AC &
0.4VA maximum @ 28V AC/DC maximum

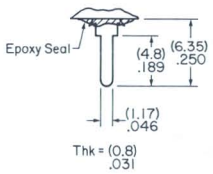
G Gold over Brass or Copper
Rated 0.4VA maximum @ 28V
AC/DC maximum

TERMINALS

01 Solder Lug



03 .250" Straight PC



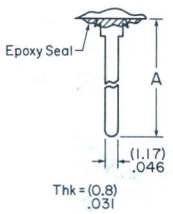
Wirewrap

05 .425" (10.8mm)

06 .750" (19.05mm)

07 .964" (24.5mm)

08 1.062" (27.0mm)



Dimension A = wirewrap terminal lengths as shown beside code boxes.

CAP & CAP COLORS

Colors Available:

A Black

B White

C Red

E Yellow

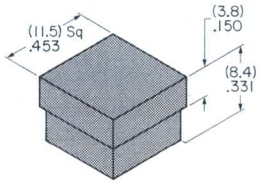
F Green

G Blue

H Gray

AT465
.453" Square

Polycarbonate

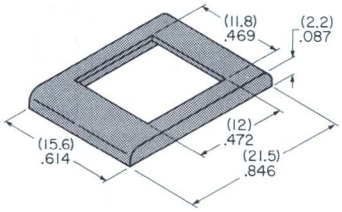


Standard finish is shiny.
Contact factory for matte finish.

OPTIONAL BEZEL & BEZEL COLORS

1 AT207 Bezel

Polycarbonate



Standard finish is shiny.
Contact factory for matte finish.

Colors Available:

A Black

B White

C Red

E Yellow

F Green

G Blue

H Gray

Pushbuttons

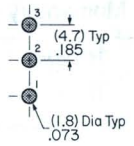
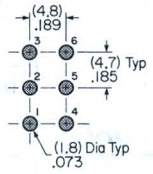
NKK SERIES M PUSHBUTTON SWITCHES

SNAP ACTION/MOMENTARY/1 & 2 POLE/SNAP-IN MOUNT

OPTIONAL BEZELS WITH LEDS

Several bezels with LEDs, AT208, AT212 and AT213 are available for use with MB2400 pushbuttons. Dimension drawings, panel cutouts, LED color codes and LED lamp specifications appear in Series E Snap-in Pushbutton Section (EB). Bezel assembly instructions may be found in Series M Snap-in Rocker Section. When ordering, specify both the bezel AT number and the LED color code.

PC BOARD MOUNTING

Single Pole	Double Pole
	

SOLDERING

Soldering time and temperature limits:

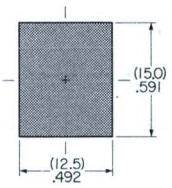
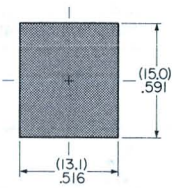
3 seconds @ 350°C

5 seconds @ 270°C

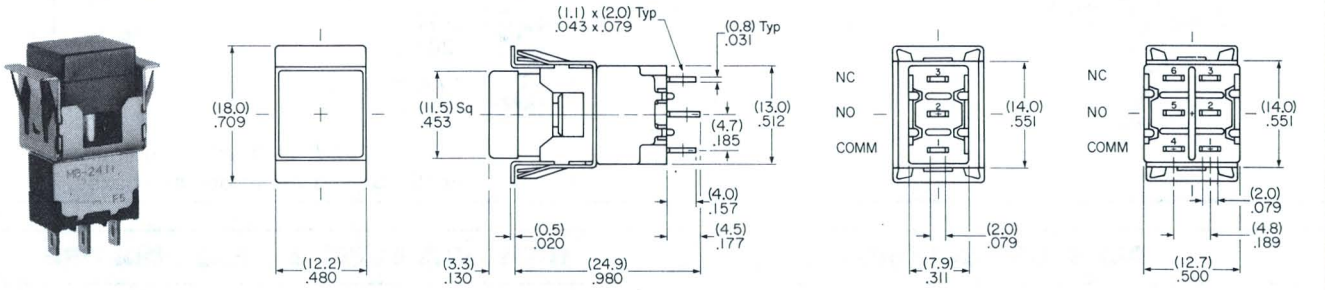
WIRING

Solder lug terminals have .043" X .079" oblong holes which accommodate 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

EFFECTIVE PANEL THICKNESS & CUTOUTS

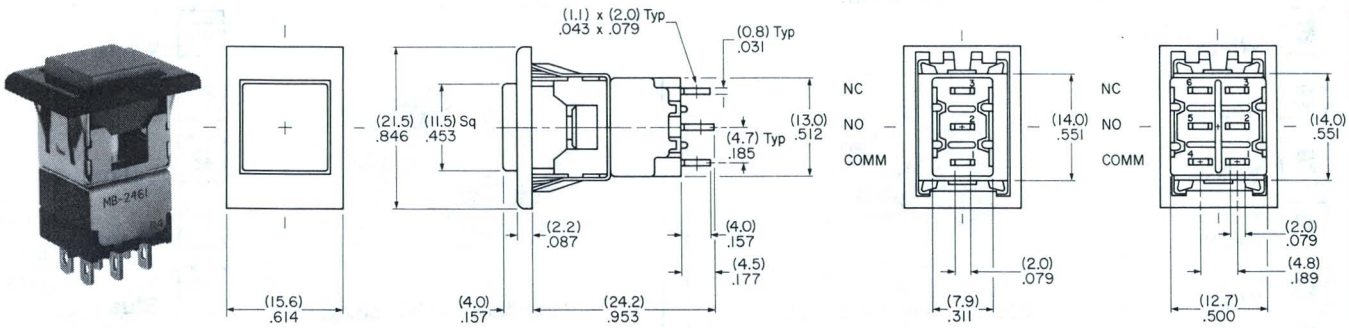
Panel Thickness without Bezel	1.0mm ~ 4.0mm (.039" ~ .157")	
Panel Thickness with Bezel	1.0mm ~ 3.2mm (.039" ~ .126")	
	Single Pole	**Double Pole**
Panel Cutouts		

Solder Lug/Single & Double Pole/Without Bezel



MB2411JW01-C Model Shown

Solder Lug/Single & Double Pole/With Bezel



MB2461JW01-C-1A Model Shown

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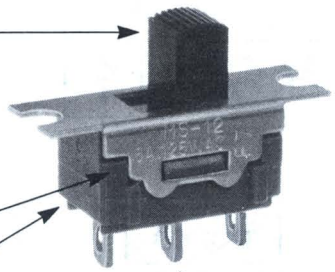
NKK SERIES M SLIDE SWITCHES

SUBMINIATURE/POWER & LOGIC LEVEL

FEATURES

- Crisp actuation clearly indicates the circuit status.
- High internal barriers between poles and insulating sheet between case and actuator block give added protection to contacts.
- Specially composed silver alloy contacts for power applications or gold contacts for logic-level applications give high contact reliability.
- Clinching of frame to case well above base for high dielectric strength.
- Standoffs prevent contamination during soldering on PC board.
- Epoxy sealed terminals prevent entry of flux, solvents, and other contaminants.
- All nonilluminated models are certified by CSA.



GENERAL SPECIFICATIONS

	For Silver Contacts	For Gold Contacts
Electrical Capacity: (Resistive Load)	6A @ 125V AC 3A @ 250V AC	0.4VA maximum @ 28V AC/DC maximum (Applicable Range: 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	10 milliohms maximum	20 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC min. between contacts & case	1,000V AC minimum between contacts 1,500V AC min. between contacts & case
Mechanical Life:	100,000 operations minimum for nonilluminated 50,000 operations minimum for illuminated	100,000 operations minimum
Electrical Life:	25,000 operations minimum	50,000 operations minimum
Total Travel:	2.2mm (.087") for on-none-on type 3.5mm (.138") for on-off-on & on-on-on	2.2mm (.087") for on-none-on type 3.5mm (.138") for on-off-on & on-on-on
Ambient Temp Range:	-10°C ~ +70°C (+14°F ~ +158°F) for nonilluminated -10°C ~ +55°C (+14°F ~ +131°F) for illuminated	

ACTUAL SIZE

MATERIALS & FINISHES

Actuator	Polyamide (UL-94V-2) or glass fiber reinforced polyester (UL-94V-0)
Frame	Stainless steel
Case	Glass fiber reinforced diallylphthalate resin (UL-94V-0)
Movable Contacts	Silver alloy (code W); or silver alloy with gold plating over nickel (code A); or copper with gold plating over nickel (code G)
Stationary Contacts	Silver capped copper with silver plating (code W); or silver alloy with gold plating over nickel (code A); or copper with gold plating over nickel (code G)
Terminals	Copper or brass with silver plating; copper or brass with gold over nickel plating.

Slides

NKK SERIES M SLIDE SWITCHES

SUBMINIATURE/POWER & LOGIC LEVEL

TYPICAL SWITCH ORDERING EXAMPLE

MS	1	2	A	S	G	30

POLES

1	SPDT
2	DPDT SP3T

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON
0	ON	ON	ON

ACTUATORS

A	.150" wide for Single or Double Pole
B	.323" wide for Double Pole

FRAMES

N	For Straight PC (Terminal 03)
F	With 2-screw Flange (Terminals 01, 05-08)
S	Support Bracket (Terminals 13, 30, & 40)

RATINGS

W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

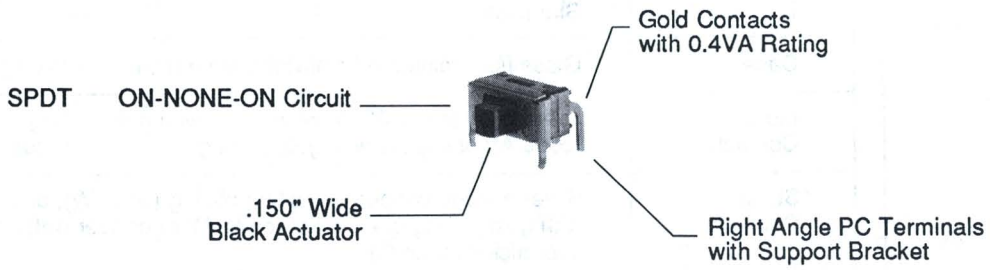
TERMINALS

01	Solder Lug
03	Straight PC
05	.425" Wirewrap
06	.750" Wirewrap
07	.964" Wirewrap
08	1.062" Wirewrap
13	Straight PC with Bracket
30	Right Angle PC
40	Vertical PC

IMPORTANT: Switches are supplied without CSA marking unless specified. See Supplement for instructions.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MS12ASG30)

SERIES M SLIDE



Slides

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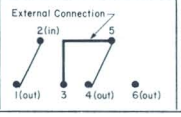
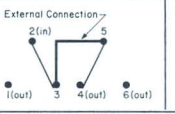
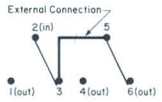
NKK SERIES M SLIDE SWITCHES

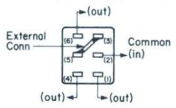
SUBMINIATURE/POWER & LOGIC LEVEL

POLES AND CIRCUITS

POLE & THROW	MODEL	SLIDE POSITION & TERMINAL NUMBERS: Down	Center	Up
SPDT	MS12 MS13	ON ON	NONE OFF	ON ON
CONNECTED TERMINALS		2-1	OPEN	2-3
SCHEMATIC				
DPDT	MS22 MS23	ON ON	NONE OFF	ON ON
CONNECTED TERMINALS		2-1 5-4	OPEN	2-3 5-6
SCHEMATIC				
SP3T	MS20	ON	ON	ON
CONNECTED TERM'S W/O EXTERNAL CONNECTIONS		2-1 5-4	2-1 5-6	2-3 5-6
SCHEMATICS				

The SP3T model is a conversion of the DPDT.

The external connections must be made during field installation.



Terminal numbers are not actually on the switch.

TERMINALS

01 Solder Lug

03 Straight PC

13 Straight PC w/Bracket

30 Right Angle PC

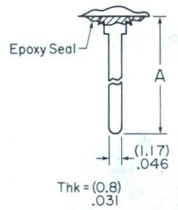
40 Vertical PC

05 Wirewrap .425" (10.8mm)

06 Wirewrap .750" (19.05mm)

07 Wirewrap .964" (24.5mm)

08 Wirewrap 1.062" (27.0mm)



Dimension A = wirewrap terminal lengths as shown beside code boxes.

SOLDERING & WIRING

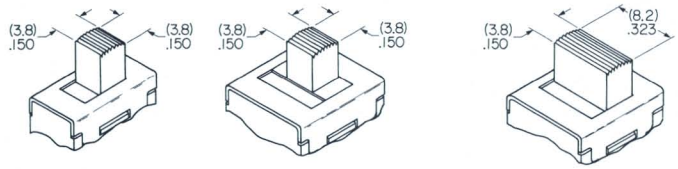
Time & Temperature Limits
3 seconds @ 350°C or 5 seconds @ 270°C

Wiring Specs
The .043" X .079" hole accommodates 1 solid 18 gauge wire or 2 solid or stranded 20 gauge wires

ACTUATORS

A .150" Wide for Single or Double Pole

B .323" Wide for Double Pole Only



CONTACT MATERIALS & RATINGS

W Silver over Silver
Rated 6A @ 125V AC & 3A @ 250V AC

A Gold over Silver
Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max

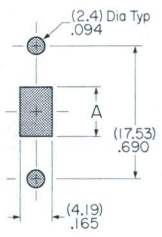
G Gold over Brass or Copper
Rated 0.4VA maximum @ 28V AC/DC maximum

Note: Contacts are nonshorting (break before make).

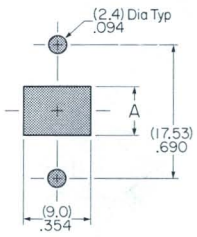
PANEL MOUNTING

Maximum Effective Panel Thickness
4.5mm (.177") for angle mount terminals
5.0mm (.197") for others

Dimension A:
6.8mm (.268") for on-none-on models
8.1m (.319") for on-off-on & on-on-on models



For Single or Double Pole with .150" Actuator



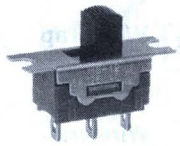
For Double Pole Only with .323" Actuator

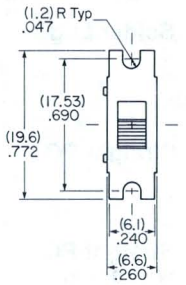
Slides

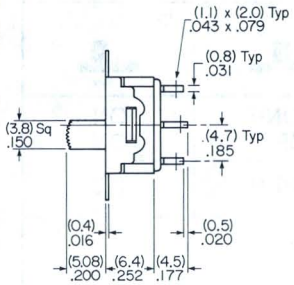
NKK SERIES M SLIDE SWITCHES

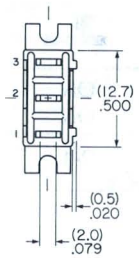
SUBMINIATURE/POWER & LOGIC LEVEL

01 Solder Lug Terminals/Single Pole





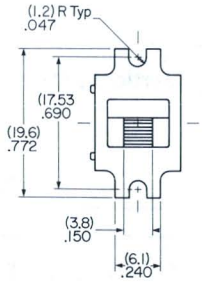


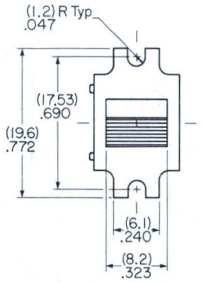


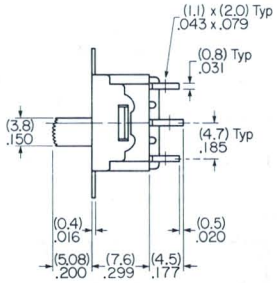
MS12AFW01 Model Shown

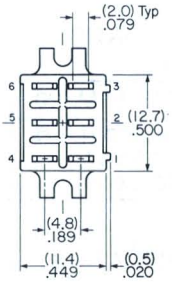
Actuator Shown in Down Position

01 Solder Lug Terminals/Double Pole





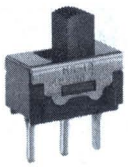


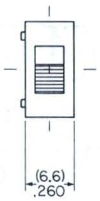


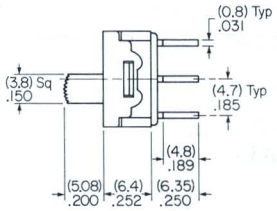
MS22BFW01 Model Shown

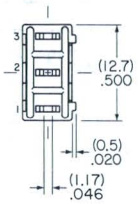
Actuator Shown in Down Position

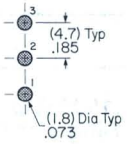
03 Straight PC Terminals/Single Pole







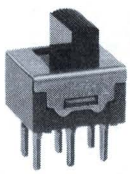


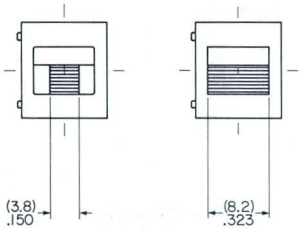


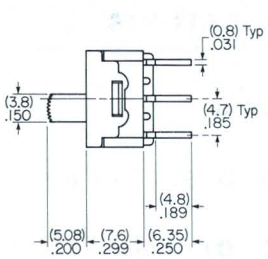
MS12ANG03 Model Shown

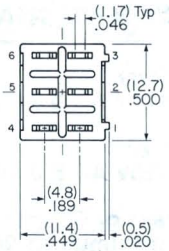
Actuator Shown in Down Position

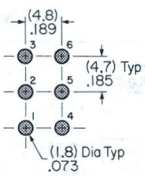
03 Straight PC Terminals/Double Pole











MS22BNG03 Model Shown

Actuator Shown in Down Position

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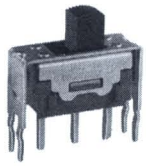
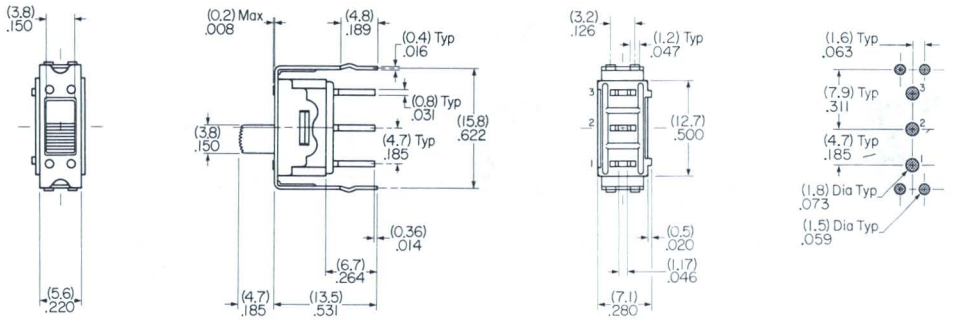
NKK SERIES M SLIDE SWITCHES

SUBMINIATURE/POWER & LOGIC LEVEL

13 Straight PC Terminals with Bracket/Single Pole

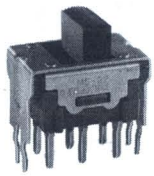


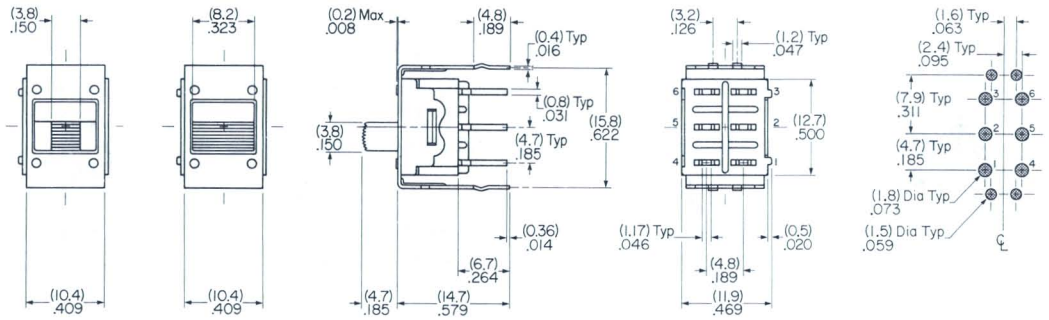


MS12ASG13 Model Shown

Actuator Shown in Down Position

13 Straight PC Terminals with Bracket/Double Pole

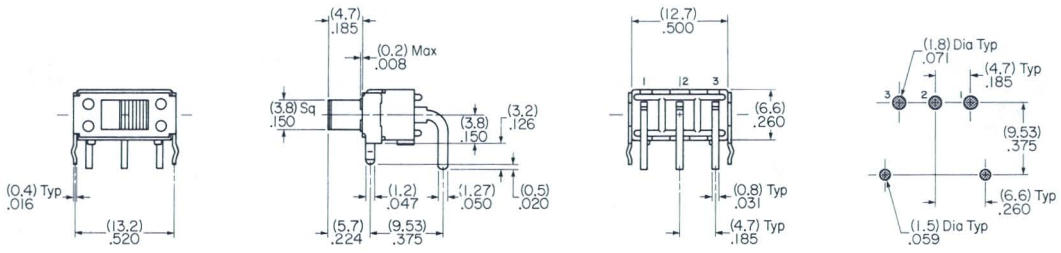




MS22BSG13 Model Shown

Actuator Shown in Down Position

30 Right Angle PC Terminals/Single Pole



MS12ASG30 Model Shown

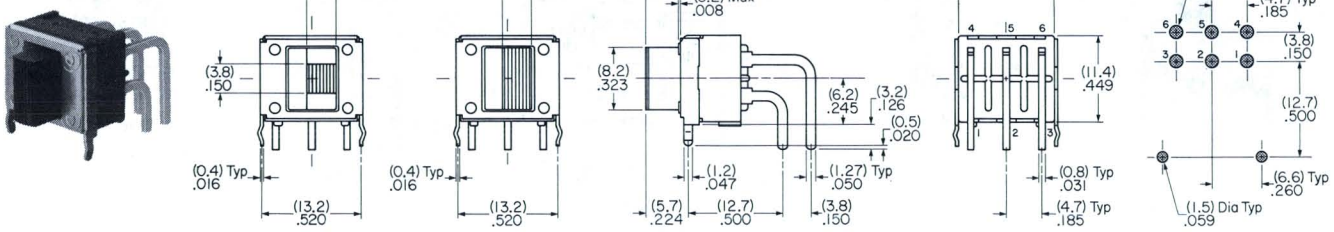
Actuator Shown in Down Position

Slides

NKK SERIES M SLIDE SWITCHES

SUBMINIATURE/POWER & LOGIC LEVEL

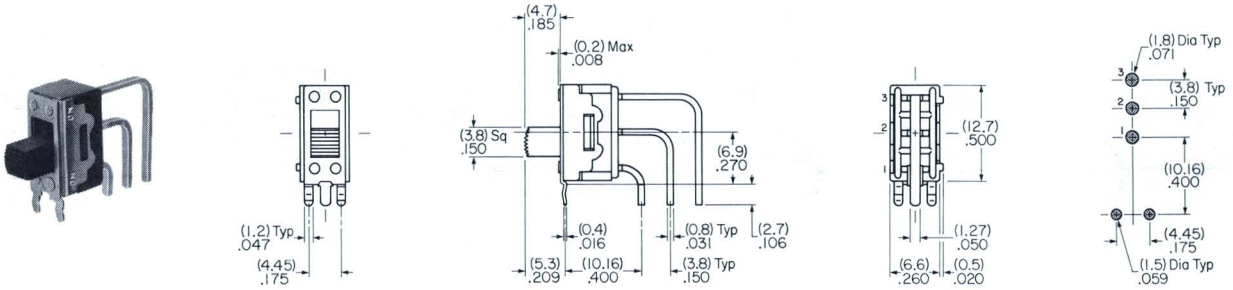
30 Right Angle PC Terminals/Double Pole



MS22BSG30 Model Shown

Actuator Shown in Down Position

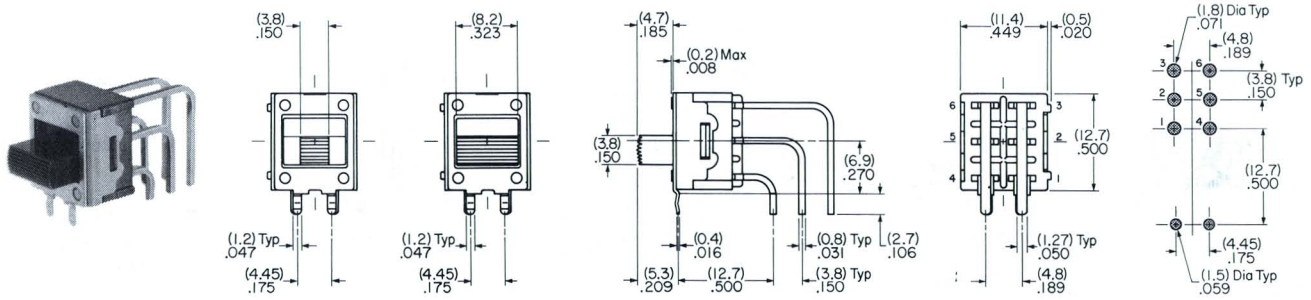
40 Vertical PC Terminals/Single Pole



MS12ASG40 Model Shown

Actuator Shown in Down Position

40 Vertical PC Terminals/Double Pole



MS22BSG40 Model Shown

Actuator Shown in Down Position

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NKK SERIES M SLIDE SWITCHES

ILLUMINATED/SUBMINIATURE/POWER RATING

TYPICAL SWITCH ORDERING EXAMPLE

MS	1	3	L	F	W	01	–	C

POLES

1	SPDT

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON

ILLUMINATION

L	LED Lighted

FRAMES

N	For Straight PC (Terminal 03)
F	With 2-screw Flange (Terminal 01)

LEDS

C	Red
E	Yellow
F	Green

TERMINALS

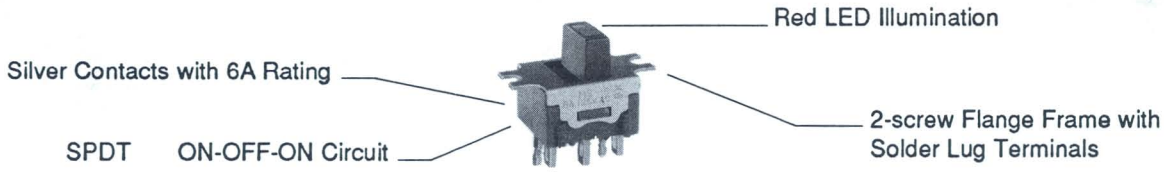
01	Solder Lug
03	Straight PC

RATINGS

W	Silver Rated 6A @ 125V AC & 3A @ 250V AC

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MS13LFW01-C)

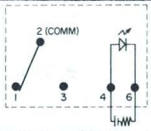
SERIES M SLIDE



POLES, CIRCUITS, AND ILLUMINATION

POLE & THROW	MODEL	SLIDE POSITION & TERMINAL NUMBERS Down	Center	Up
SPDT	MS12	ON	NONE	ON
CONNECTED POWER TERMINALS		2-1	NONE	2-3
LED ILLUMINATION		ON	NONE	ON
CONNECTED LAMP TERMINALS		4-6	NONE	4-6
DPDT	MS13	ON	OFF	ON
CONNECTED POWER TERMINALS		2-1	OPEN	2-3
LED ILLUMINATION		ON	ON	ON
CONNECTED LAMP TERMINALS		4-6	4-6	4-6

SCHEMATIC

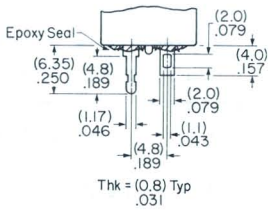


Note: LED circuit is isolated & requires an external switch.

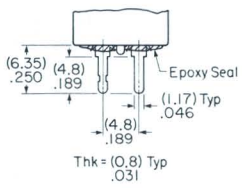
Terminal numbers are not actually on the switch.

TERMINALS

01 Solder Lug



03 Straight PC



The soldering time and temperature limits are
3 seconds at 350°C
5 seconds at 270°C.

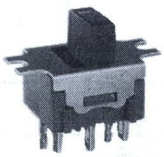
Wiring Specifications
.043" X .079" hole accommodating
1 solid 18 gauge wire or
2 solid or stranded 20 gauge wires

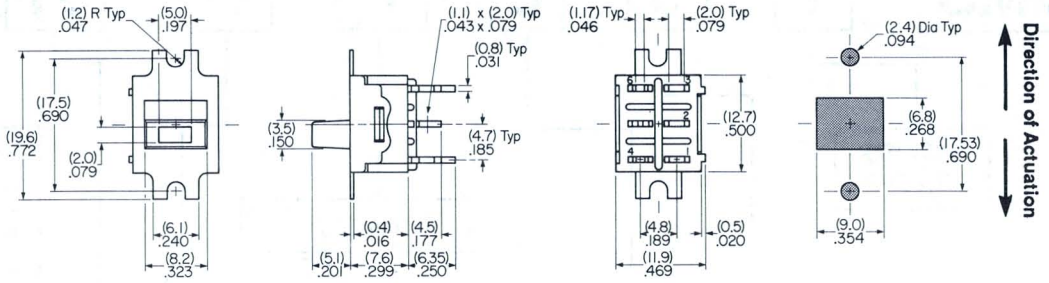
Slides

SERIES M SLIDE SWITCHES

ILLUMINATED/SUBMINIATURE/POWER RATING

01 Solder Lug Terminals/Single Pole



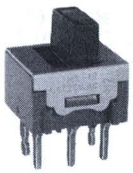


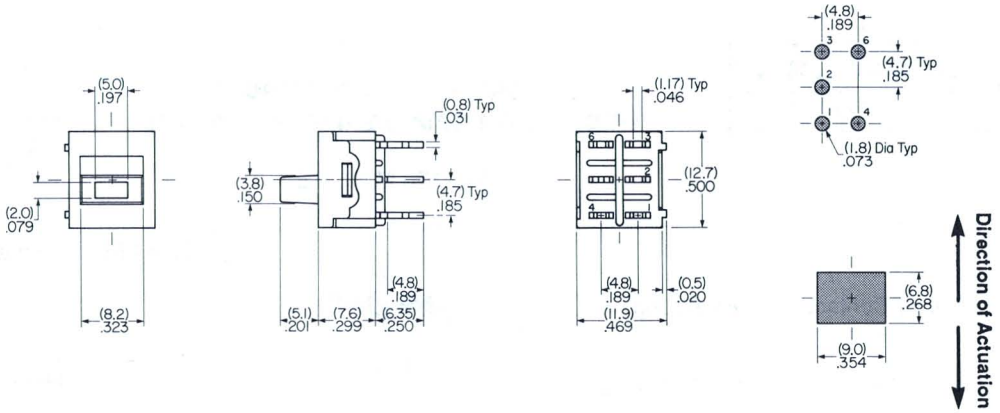
MS12LFW01-C Model Shown

Actuator Shown in Down Position

Max. Panel Thickness: 5.0mm (.197")

03 Straight PC Terminals/Single Pole



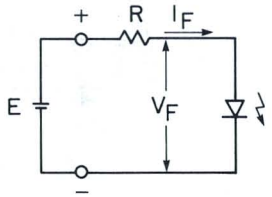


MS12LNW03-C Model Shown

Actuator Shown in Down Position

Max. Panel Thickness: 5.0mm (.197")

ELECTRICAL SPECIFICATIONS FOR SINGLE ELEMENT LED



$$R = \frac{E - V_F}{I_F}$$

Where: R = Resistor Value (Ohms)
E = Source Voltage (V)
V_F = Forward Voltage (V)
I_F = Forward Current (mA)

		Red	Yellow	Green
Forward Peak Current	I_{FM}	20ma	20mA	20mA
Continuous Forward Current	I_F	16mA	16mA	16mA
Forward Voltage	V_F	2.07V	2.15V	2.16V
Reverse Peak Voltage	V_{RM}	3V	4V	4V
Current Reduction Rate Above 25°C	ΔI_F	0.27mA/°C	0.27mA/°C	0.27mA/°C

The electrical specifications shown above are determined at a basic temperature of 25°C. If the source voltage exceeds the LED's rated voltage, the required ballast resistor value can be calculated by using the accompanying formula.

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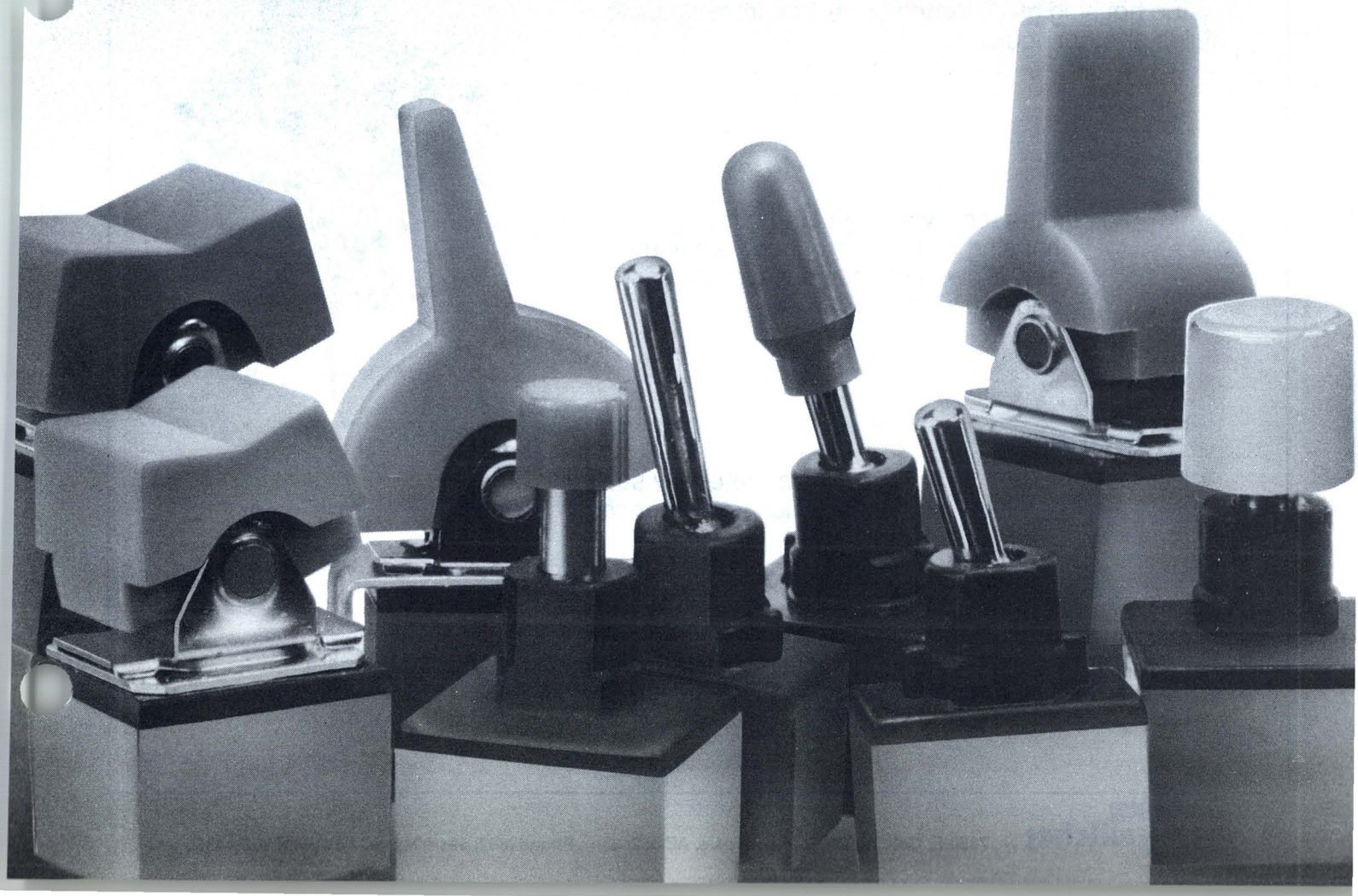
SERIES M2

WASHABLE SUBMINIATURE SWITCHES

- TOGGLES
- ROCKERS
- PUSHBUTTONS



NKK SERIES M2

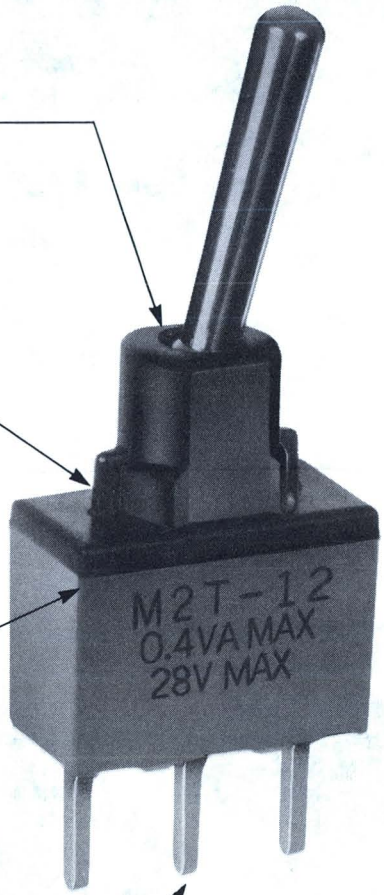
SUBMINIATURE/WASHABLE/PCB MOUNTING

DISTINCTIVE FEATURES

An o-ring surrounding the toggle above the ball joint serves as a bushing seal to prevent entry of dust or liquids which might splash on the switch.

Antijamming actuator design protects against mechanism damage from downward force on the toggle or plunger.

Single unit construction of the bushing and top of the housing gives added protection from washing fluids or other liquids.



Ultrasonic welding of the bushing & housing units seals out contaminants and allows automated wave soldering and washing.

Actual Size

Terminals are epoxy sealed to prevent entry of flux and other contaminants.

Logic level and power capabilities are available to suit varying customer applications.

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NKK SERIES M2 TOGGLES & ROCKERS

SUBMINIATURE/WASHABLE/PCB MOUNTING

GENERAL SPECIFICATIONS

	For Silver Contacts	For Gold Contacts
Electrical Capacity: (Resistive Load)	6A @ 125V AC or 3A @ 250V AC 4A @ 30V DC (ON-ON circuit) 3A @ 30V DC (all other circuits)	0.4VA maximum @ 28V AC/DC maximum (Applicable Range: 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	10 milliohms maximum	20 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC min. between contacts & case	1,000V AC minimum between contacts 1,500V AC min. between contacts & case
Mechanical Life:	100,000 operations minimum for toggles 50,000 operations min. for rockers	100,000 operations minimum for toggles 50,000 operations min. for rockers
Electrical Life:	25,000 operations minimum	50,000 operations minimum
Angle of Throw:	26°	26°
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F)	

MATERIALS & FINISHES

Toggle/Lever	Brass (chrome plated for toggles & nickel plated lever for rockers)
Mounting Frame	Chrome over brass
Bushing/Housing	Fiberglass reinforced polyamide
Sealing Ring	Nitrile butadiene rubber
Base	Fiberglass reinforced polyamide
Movable Contacts	Copper or brass with gold over nickel (logic level); silver alloy with silver plating (power)
Stationary Contacts	Copper or brass with gold over nickel (logic level); silver alloy with silver plating (power)
Terminals	Copper or brass with silver or gold plating

UL & CSA

Models rated 6A @ 125V AC, 3A @ 250V AC, and 0.4VA @ 28V AC/DC are recognized by Underwriters Laboratories Inc. and certified by Canadian Standards Association:

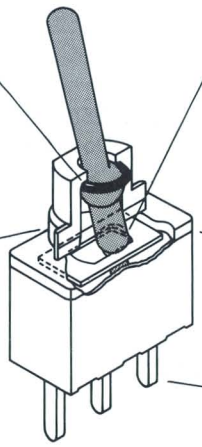
UL File No. E44145

CSA File Nos. LR23535 and LR56017

WASHABILITY & ANTIJAMMING DESIGN

(1) The interior bushing area is sealed with an o-ring which surrounds the toggle. (The switch should not be actuated during washing.)

(2) The bushing and top of the housing are one molded piece thus achieving the exterior bushing seal.



(3) The step at the bottom of the toggle joint and a plate at the top of the housing resist downward movement of the lever and protect the contact mechanism.

(4) Ultrasonic welding is used to seal the bushing unit to the base.

(5) Terminals are epoxy sealed for safeguarding the switch at the base.

NKK SERIES M2 TOGGLE SWITCHES

SUBMINIATURE/WASHABLE/PCB MOUNTING

TYPICAL SWITCH ORDERING EXAMPLE

M2T	1	2	S	A5	G	03

POLES

1	SPDT
2	DPDT

BUSHINGS

A5	.250" Double Flatted

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)

( ) = Momentary

RATINGS

W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

ACTUATORS

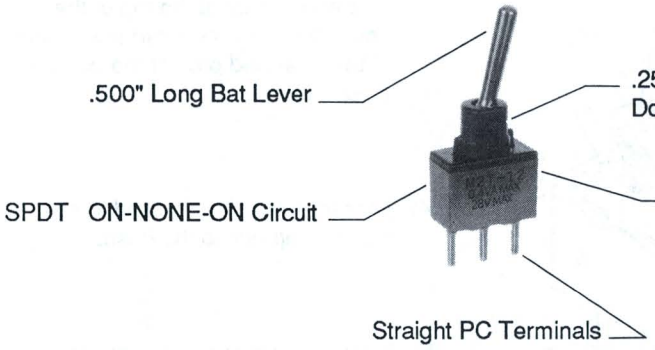
S	.500" Bat Lever
S4	.300" Bat Lever

PC TERMINALS

03	.250" Straight
05	.425" Wirewrap
06	.750" Wirewrap
07	.964" Wirewrap
13	.250" Straight w/.460" Bracket
30	.150" Right Angle
40	.150" Vertical

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2T12SA5G03)

SERIES M2T TOGGLE



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

Standard combinations: S bat lever with 03 terminals with silver or gold contacts; S4 bat lever with 13, 30 & 40 terminals with gold contacts.

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NKK SERIES M2 TOGGLE SWITCHES

SUBMINIATURE/WASHABLE/PCB MOUNTING

POLES AND CIRCUITS

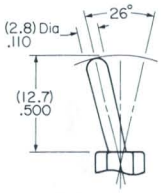
POLE & THROW	MODEL	TOGGLE POSITION & TERMINAL NUMBERS ( ) = Momentary: Down	Center	Up
SPDT	M2T12	ON	NONE	ON
	M2T13	ON	OFF	ON
	M2T15	ON	NONE	(ON)
	M2T18	(ON)	OFF	(ON)
	M2T19	ON	OFF	(ON)
CONNECTED TERMINALS		2-3	OPEN	2-1
SCHEMATIC				
DPDT	M2T22	ON	NONE	ON
	M2T23	ON	OFF	ON
	M2T25	ON	NONE	(ON)
	M2T28	(ON)	OFF	(ON)
	M2T29	ON	OFF	(ON)
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4
SCHEMATIC				

Terminal numbers are not actually on the switch.

ACTUATORS

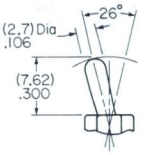
S

.500" Bat Lever
Chrome over brass



S4

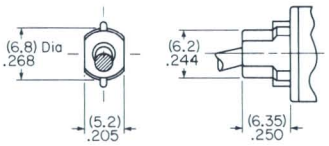
.300" Bat Lever
Chrome over brass



BUSHING

A5

.250" Double Flatted



RATINGS

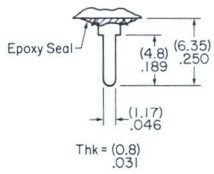
W **Silver over Silver**
6A @ 125V AC &
3A @ 250V AC

A **Gold over Silver**
6A @ 125V AC &
0.4VA maximum @ 28V
AC/DC maximum

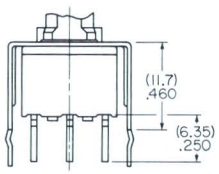
G **Gold**
0.4VA maximum @ 28V
AC/DC maximum

PC TERMINALS

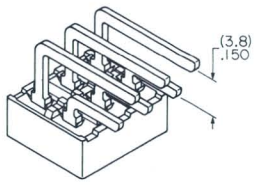
03 **.250" Straight**



13 **.250" Straight w/.460" Bracket**



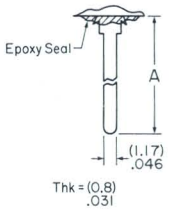
30 **.150" Right Angle**



05 **.425" (10.8mm) Wire Wrap**

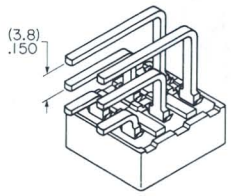
06 **.750" (19.05mm) Wire Wrap**

07 **.964" (24.5mm) Wire Wrap**



Dimension A represents terminal dimensions shown with the codes at the left.

40 **.150" Vertical**

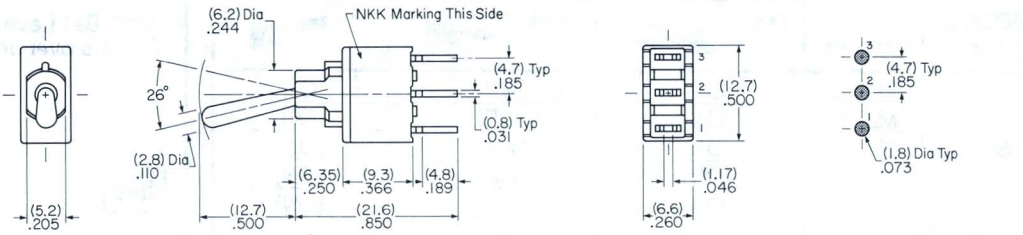


Soldering Time & Temperature Limits: 3 seconds @ 350°C; 5 seconds @ 270°C
Only freon or alcohol based cleaning solutions are recommended.

NKK SERIES M2 TOGGLE SWITCHES

SUBMINIATURE/WASHABLE/PCB MOUNTING

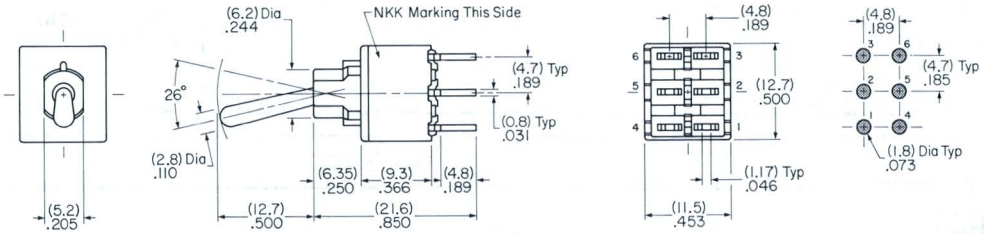
03 Straight PC Terminals/Single Pole



M2T12SA5G03 Model Shown

Actuator in DOWN position.

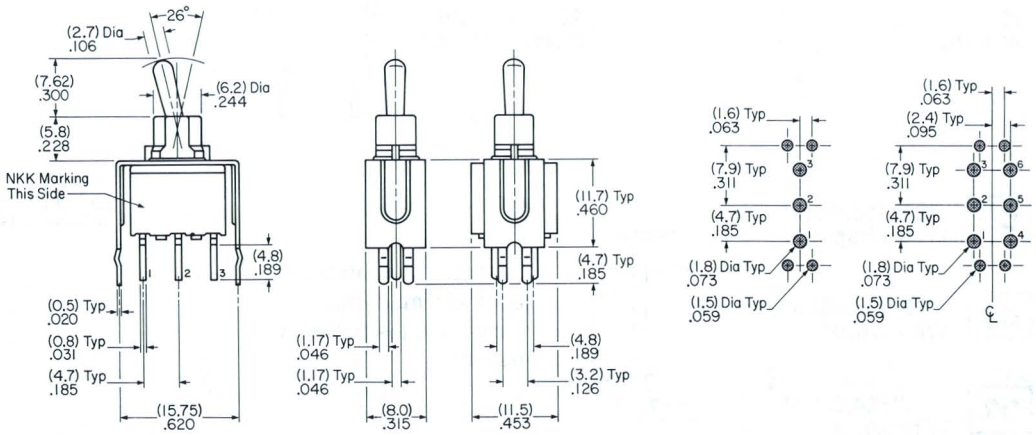
03 Straight PC Terminals/Double Pole



M2T22SA5G03 Model Shown

Actuator in DOWN position.

13 Straight PC Terminals with Bracket/Single & Double Pole



M2T12S4A5G13 Model Shown

Actuator in DOWN position.

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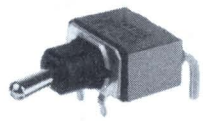
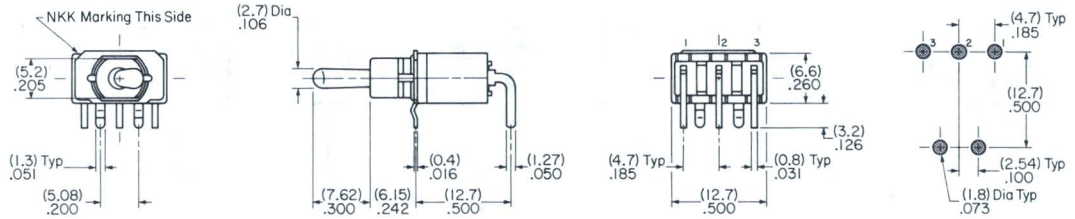
NKK SERIES M2 TOGGLE SWITCHES

SUBMINIATURE/WASHABLE/PCB MOUNTING

30 Right Angle PC Terminals/Single Pole

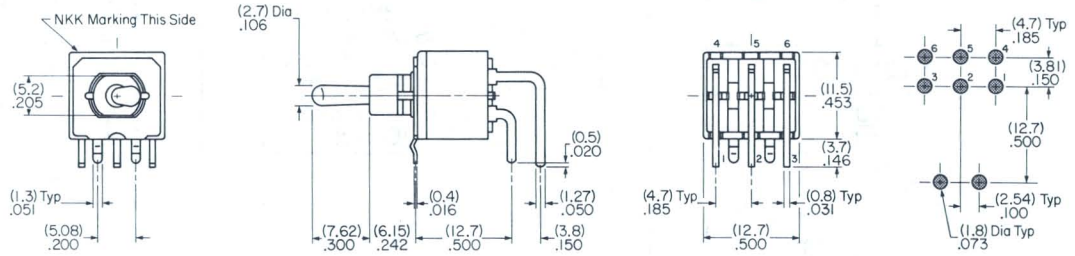




M2T12S4A5G30 Model Shown

Actuator in DOWN position.

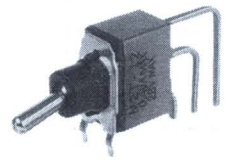
30 Right Angle PC Terminals/Double Pole

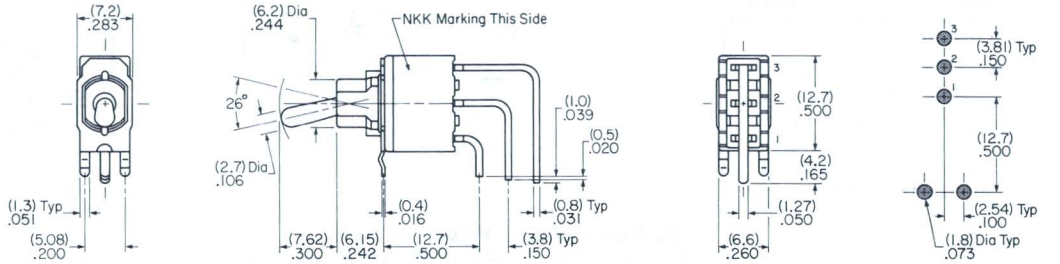


M2T22S4A5G30 Model Shown

Actuator in DOWN position.

40 Vertical PC Terminals/Single Pole

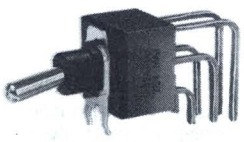


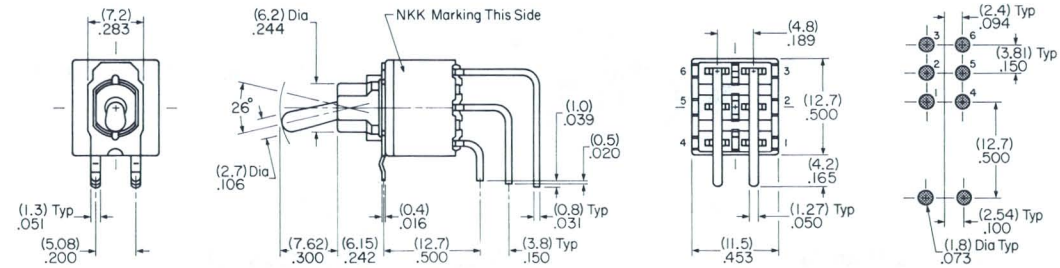


M2T12S4A5G40 Model Shown

Actuator in DOWN position.

40 Vertical PC Terminals/Double Pole





M2T22S4A5G40 Model Shown

Actuator in DOWN position.

NKK SERIES M2 ROCKER SWITCHES

SUBMINIATURE/WASHABLE/PCB MOUNTING

TYPICAL SWITCH ORDERING EXAMPLE

M2T 2 8 TX G 41 — G C

POLES

1	SPDT
2	DPDT

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)

( ) = Momentary

ACTUATOR/FRAME

TX	Small Actuator with Straight or Angle PC Mount
TZ	Large Actuator with Straight PC Mount for terminal 23 only

RATINGS

W	Silver Rated 6A @ 125V AC & 3A @ 250V AC
A	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

PC TERMINALS

13	.250" Straight w/.460"Bracket
23	.250" Straight PC w/.460" Bracket (for TZ)
30	.150" Right Angle
41	.150" Vertical

ROCKERS/PADDLES

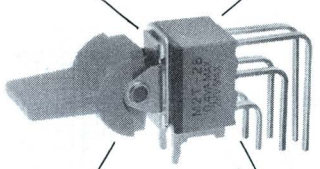
	For TX Frame
D	.365" Wide Rocker
E	.365" Wide Paddle
F	.453" Wide Rocker
G	.453" Wide Paddle
K	.476" Wide Paddle
	For TZ Frame
J	.598" Wide Rocker
H	.598" Wide Paddle

ROCKER/PADDLE COLORS

A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2T28TXG41-GC)

SERIES M2T PADDLE



Actuator Frame for Rockers/Paddles

DPDT (ON)-OFF-(ON) Circuit

.150" Vertical PC Terminals

.453" Wide Red Paddle

Gold Contacts with 0.4VA Rating

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

Standard combinations: terminal 13 with silver or gold contacts; terminals 30 & 41 with gold contacts.

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NKK SERIES M2 ROCKER SWITCHES

SUBMINIATURE/WASHABLE/PCB MOUNTING

ADDITIONAL DETAIL

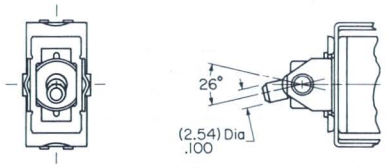
See page N5 for details concerning Poles & Circuits, Contact Materials & Ratings. Terminal details are on page N5 and on following dimension drawings.

ACTUATOR/MOUNTING FRAME

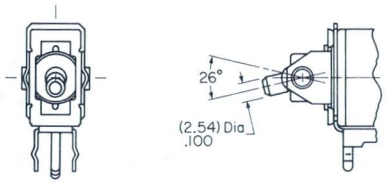
TX **Small Actuator with Straight or Angle PC Mount**

The TX code describes a device which accepts a small actuator and mounts to a PC board with a bracket or support depending upon terminal selected. Note: For use with terminal codes 13, 30, and 41.

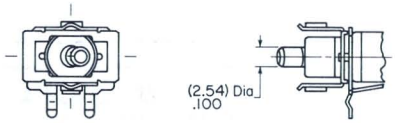
Straight PC Mounting



Vertical PC Mounting

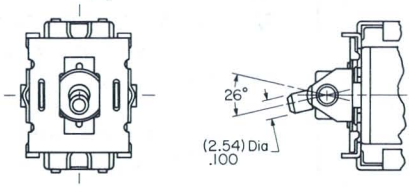


Right Angle PC Mounting



TZ **Large Actuator with Straight PC Mount**

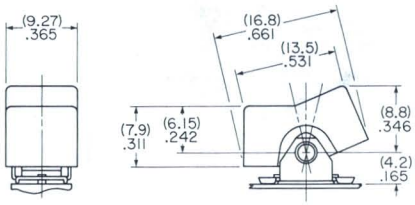
The TZ code describes a device which accepts a large actuator and mounts to a PC board with a bracket. Note: For use with terminal code 23 only.

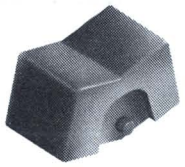


ROCKERS & PADDLES

Used with TX code only

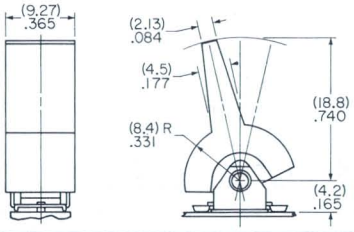
D **AT4148**
.365" Wide Rocker

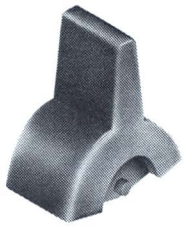




Nylon

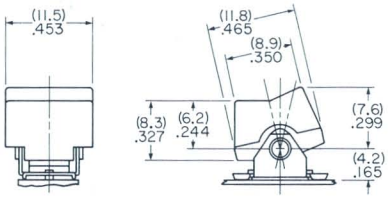
E **AT4149**
.365" Wide Paddle





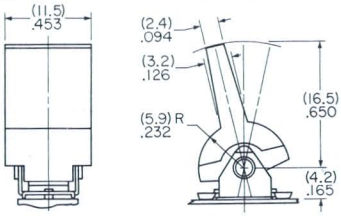
Nylon

F **AT4150**
.453" Wide Rocker



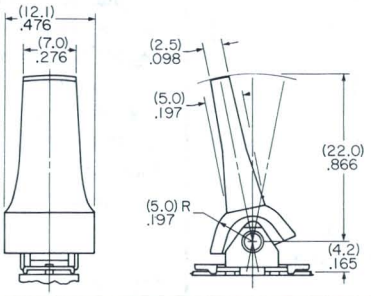
Nylon

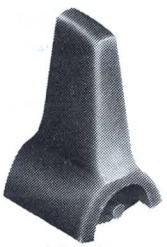
G **AT4151**
.453" Wide Paddle



Nylon

K **AT461**
.476" Wide Paddle





Polycarbonate

Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

NKK SERIES M2 ROCKER SWITCHES

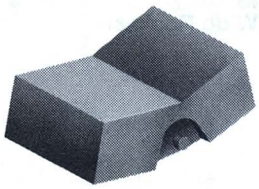
SUBMINIATURE/WASHABLE/PCB MOUNTING

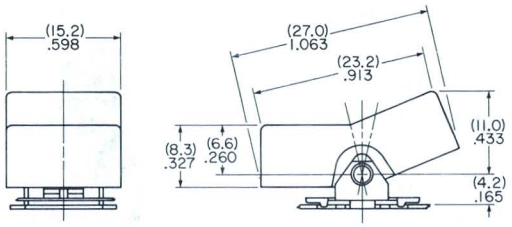
ROCKER & PADDLE

Used with TZ code only

J **AT4156**
.598" Rocker

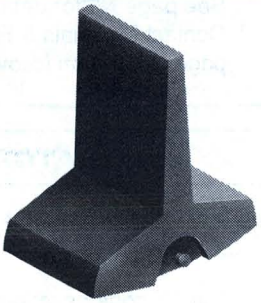
Nylon

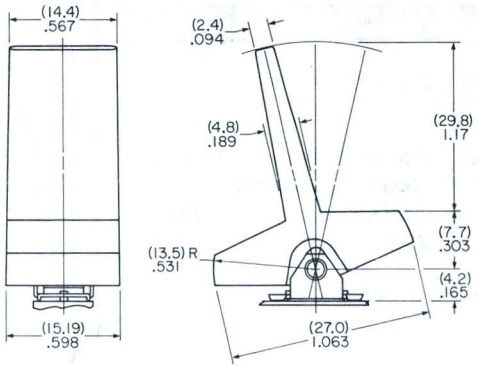




H **AT4157**
.598" Wide Paddle

Nylon



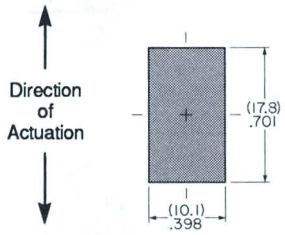


Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

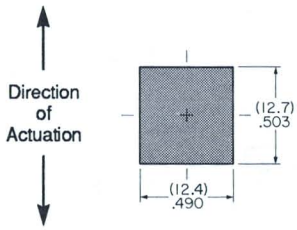
PANEL CUTOUTS

For TX Frame

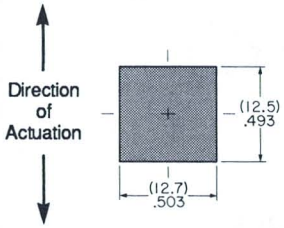
With AT4148 & AT4149



With AT4150, AT4151 & AT466

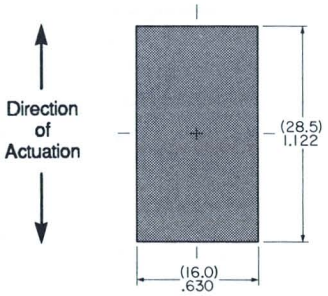


With AT461



For TZ Frame

With AT4156 & AT4157



PCB MOUNTING

Soldering Time & Temperature Limitations:

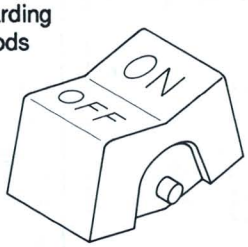
3 seconds @ 350°C or

5 seconds @ 270°C.

Only freon or alcohol based cleaning solutions are recommended.

LEGENDS

Several methods of placing legends on the face of the rocker are available. The preferred method is pad printing due to the increased legend life. Hot stamping and engraving are also available. Details regarding these methods may be obtained from the factory.



UL & CSA

All models rated 6A @ 125V AC, 3A @ 250V AC, & 0.4VA @ 28V AC/DC are recognized by Underwriters Laboratories Inc.

UL File No. E44145

All models rated 6A @ 125V AC, 3A @ 250V AC, & 0.4VA @ 28V AC/DC are certified by Canadian Standards Association.

CSA File Nos.
LR23535 and LR56017

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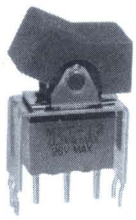
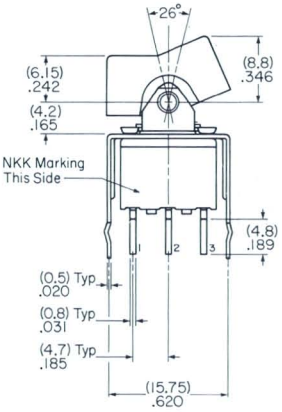
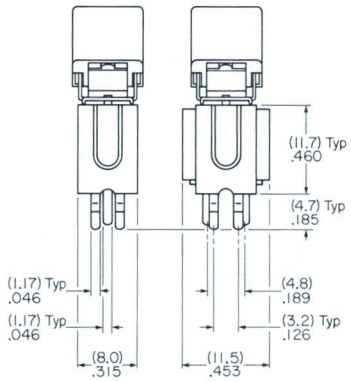
NKK SERIES M2 ROCKER SWITCHES

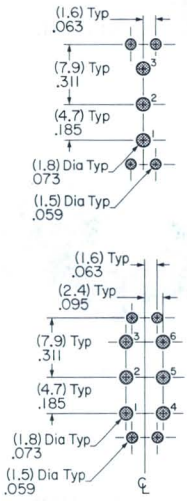
SUBMINIATURE/WASHABLE/PCB MOUNTING

13 Small Rocker/Straight PC Terminals with Bracket/Single & Double Pole



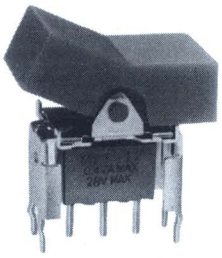


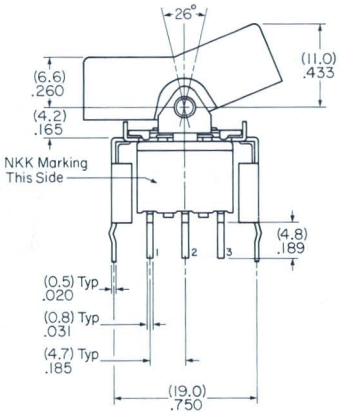


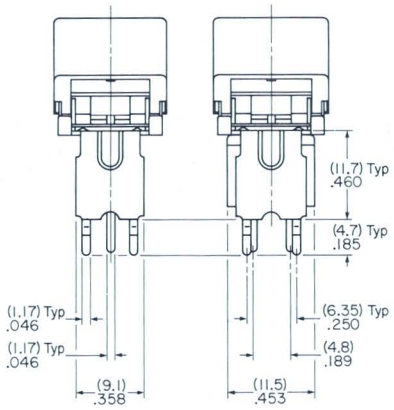


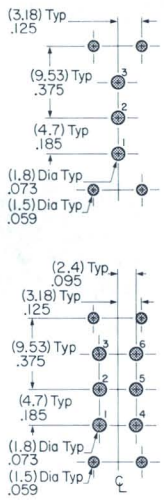
M2T12TXG13-DC Model Shown Actuator in DOWN position.

23 Large Rocker/Straight PC Terminals with Crimped Bracket/Single & Double Pole



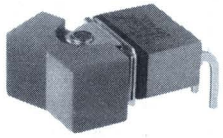


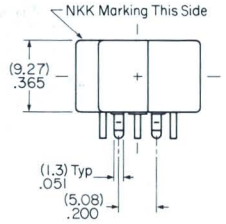


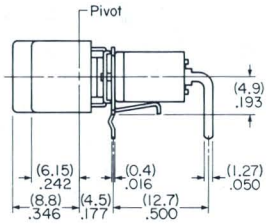


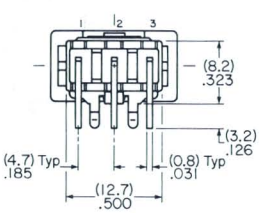
M2T22TZG23-JC Model Shown Actuator in DOWN position.

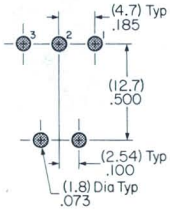
30 Small Rocker/Right Angle PC Terminals/Single Pole









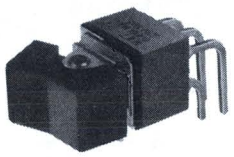


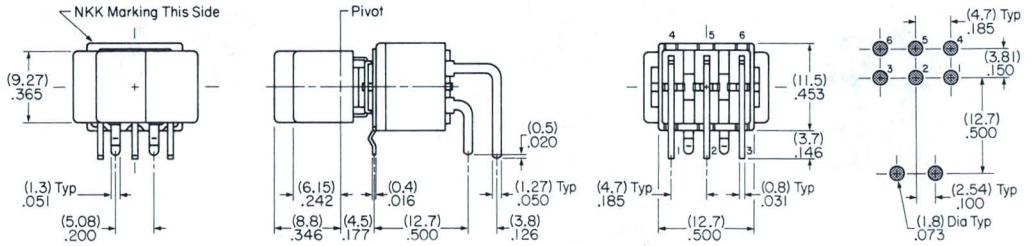
M2T12TXG30-DC Model Shown Actuator in DOWN position.

NKK SERIES M2 ROCKER SWITCHES

SUBMINIATURE/WASHABLE/PCB MOUNTING

30 Small Rocker/Right Angle PC Terminals/Double Pole

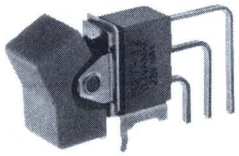


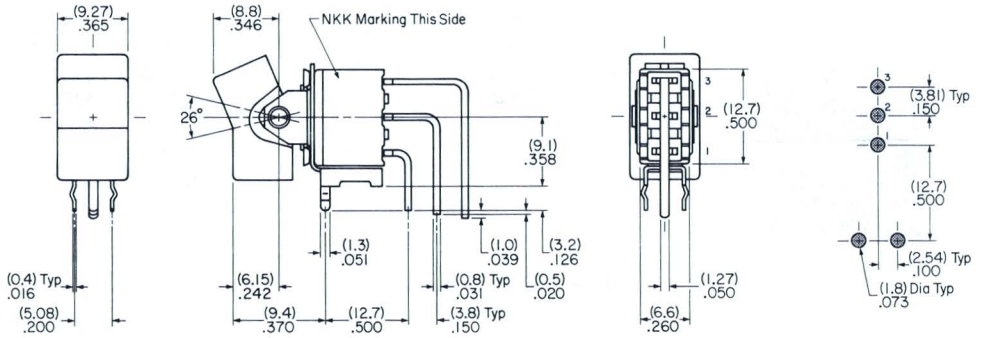


M2T22TXG30-DC Model Shown

Actuator in DOWN position.

41 Small Rocker/Vertical PC Terminals/Single Pole

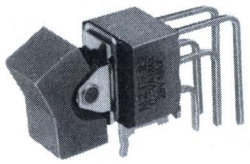


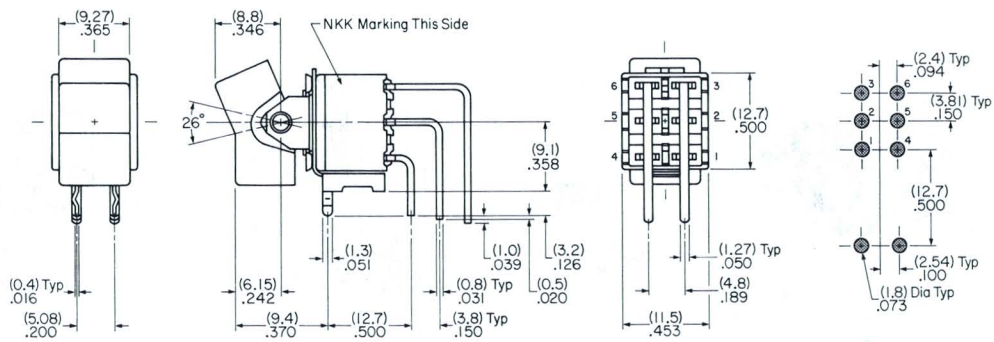


M2T12TXG41-DC Model Shown

Actuator in DOWN position.

41 Small Rocker/Vertical PC Terminals/Double Pole





M2T22TXG41-DC Model Shown

Actuator in DOWN position.

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NKK SERIES M2 PUSHBUTTON SWITCHES

SUBMINIATURE/SNAP ACTION/WASHABLE/PCB MOUNT

GENERAL SPECIFICATIONS

	For Silver Contacts	For Gold Contacts
Electrical Capacity: (Resistive Load)	1A @ 125V AC 1A @ 30V DC	0.4VA max. @ 28V AC/DC max. (Applicable Range: 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	20 milliohms maximum	30 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC min. between contacts & case	1,000V AC minimum between contacts 1,500V AC min. between contacts & case
Mechanical Life:	200,000 operations minimum	200,000 operations minimum
Electrical Life:	25,000 operations minimum	100,000 operations minimum
Total Travel:	1.0mm (.039")	1.0mm (.039")
Ambient Temp Range:	-25°C through +70°C (-13°F through +158°F)	

MATERIALS & FINISHES

Plunger	Brass with nickel plating
Bushing/Housing	Fiberglass reinforced polyamide
Sealing Ring	Nitrile butadiene rubber
Base	Fiberglass reinforced polyamide
Movable Contacts	Copper or brass w/gold over nickel (logic level); silver alloy w/silver plating (power)
Stationary Contacts	Copper or brass w/gold over nickel (logic level); silver alloy w/silver plating (power)
Terminals	Brass with silver or gold plating

UL & CSA

All models rated 1A @ 125V AC, 1A @ 30V AC, & 0.4VA @ 28V AC/DC are recognized by Underwriters Laboratories Inc.

UL File No. E44145

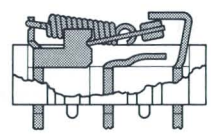
All models rated 1A @ 125V AC, 1A @ 30V AC, & 0.4VA @ 28V AC/DC are certified by Canadian Standards Association.

CSA File Nos.
LR23535 and LR56017

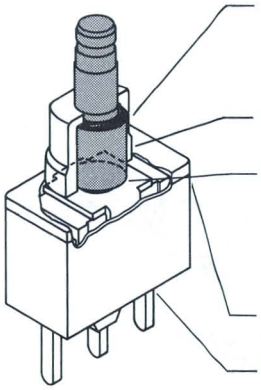
SNAP-ACTING CONTACTS

The snap-acting contact mechanism in these devices gives the M2 pushbuttons short travel, sensitive actuation, light touch, smooth feel, audible feedback, and longer electrical life.

The contact mechanism is double throw with a normally closed and a normally open contact.



WASHABILITY & ANTIJAMMING DESIGN



(1) The interior bushing area is sealed with an o-ring which surrounds the plunger. (The switch should not be actuated during any washing process.)
(2) An exterior bushing seal is achieved by molding a 1-piece bushing/housing top.
(3) The step at the bottom of the plunger & a plate at the top of the housing resist downward movement of the plunger beyond the total travel distance, thus protecting the contact mechanism.
(4) Ultrasonic welding seals the bushing unit to the base.
(5) Terminals are epoxy sealed for safeguarding the switch at the base.

NKK SERIES M2 PUSHBUTTON SWITCHES

SUBMINIATURE/SNAP ACTION/WASHABLE/PCB MOUNT

TYPICAL SWITCH ORDERING EXAMPLE

M2B	15	B	A5	G	30	—	C	C

POLES & CIRCUITS

15	SPDT	ON	(ON)
25	DPDT	ON	(ON)
( ) = Momentary			

PLUNGERS

A	.282" Long for caps F & H
B	.307" Long for caps B & C

BUSHING

A5	.250" Double Flatted

RATINGS

W	Silver Rated 1A @ 125V AC & 1A @ 30V DC
A	Gold over Silver Rated 1A @ 125V AC & 0.4VA max @ 28V AC/DC max
G	Gold Rated 0.4VA max @ 28V AC/DC max

PC TERMINALS

03	Straight
13	Straight w/Bracket
30	Right Angle
40	Vertical

SNAP-ON CAPS

For Plunger A	
F	.201" Diameter
H	.295" Diameter
For Plunger B	
B	.315" Diameter
C	.394" Diameter

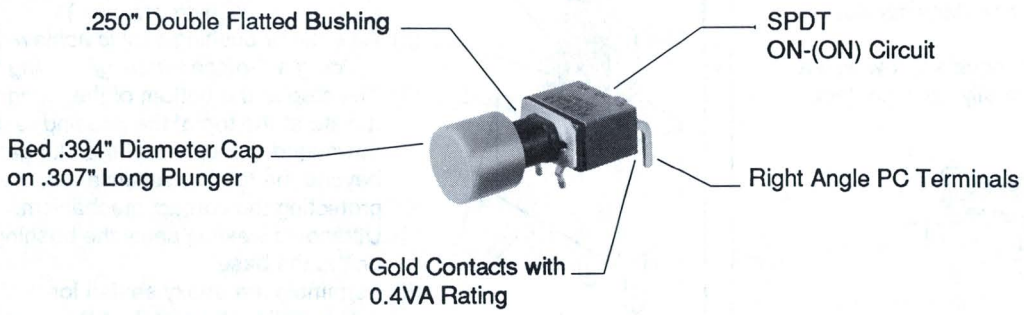
CAP COLORS

A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2B15BA5G30-CC)

SERIES M2B PUSHBUTTON

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.



W & G are the standard contact materials & ratings.

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NKK SERIES M2 PUSHBUTTON SWITCHES

SUBMINIATURE/SNAP ACTION/WASHABLE/PCB MOUNT

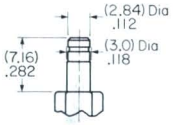
POLES AND CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary — Normal	Down
SPDT	M2B15	ON	(ON)
CONNECTED TERMINALS		1-3	1-2
SCHEMATIC			
DPDT	M2B25	ON	(ON)
CONNECTED TERMINALS		1-3 4-6	1-2 4-5
SCHEMATIC			

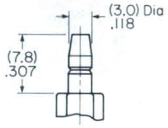
Terminal numbers are not actually on the switch.

PLUNGERS

A **.282" Long**
Chrome
over brass

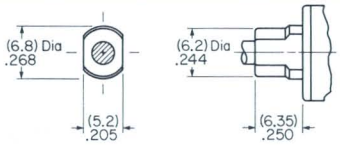


B **.307" Long**
Chrome
over brass



BUSHING

A5
.250" Double Flatted



MOUNTING CONSIDERATIONS

Soldering Time & Temperature Limits
3 seconds @ 350°C
5 seconds @ 270°C

Only freon or alcohol based cleaning solutions recommended.

RATINGS

W **Silver over Silver**
1A @ 125V AC &
1A @ 30V DC

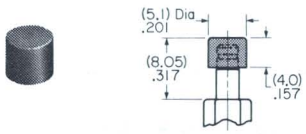
A **Gold over Silver**
1A @ 125V AC &
0.4VA maximum @ 28V
AC/DC maximum

G **Gold**
0.4VA maximum @ 28V
AC/DC maximum

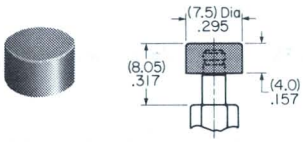
SNAP-ON CAPS

For Plunger Type A

F **AT475**
.201" Diameter
Polycarbonate
Colors: A B C

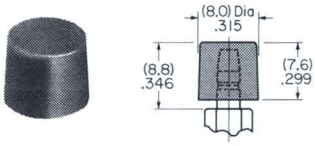


H **AT496**
.295" Diameter
Polycarbonate
Colors: A B C

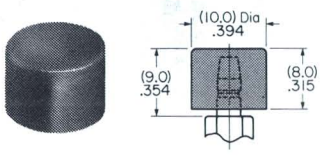


For Plunger Type B

B **AT443**
.315" Diameter
Polycarbonate
Colors: A B C E F G H



C **AT442**
.394" Diameter
Polycarbonate
Colors: A B C E F G H

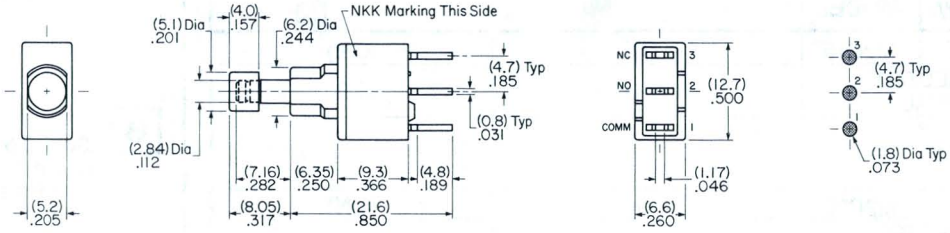


Color Codes: **A** Black **B** White **C** Red **E** Yellow
F Green **G** Blue **H** Gray

SERIES M2 PUSHBUTTON SWITCHES

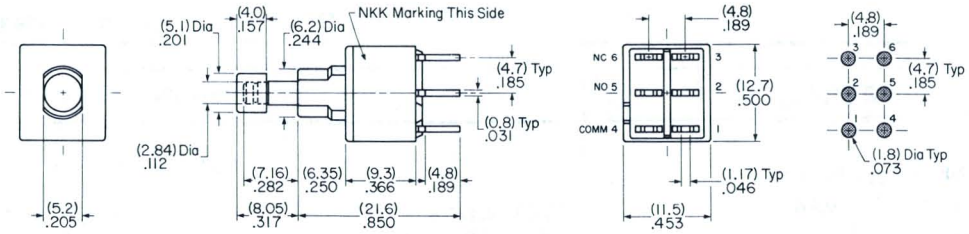
SUBMINIATURE/SNAP ACTION/WASHABLE/PCB MOUNT

03 Straight PC Terminals/Single Pole



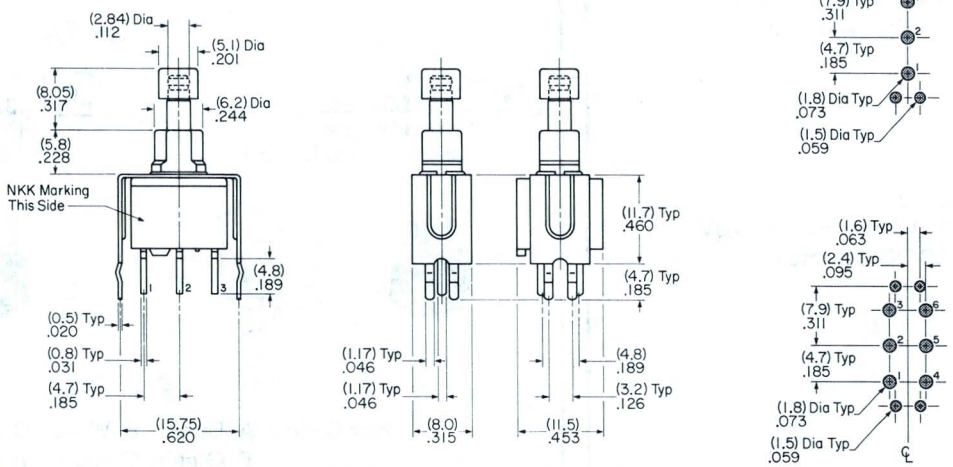
M2B15AA5G03-FC Model Shown

03 Straight PC Terminals/Double Pole



M2B25AA5G03-FC Model Shown

13 Straight PC Terminals with Bracket/Single & Double Pole



M2B25AA5G13-FC Model Shown

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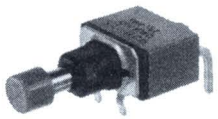
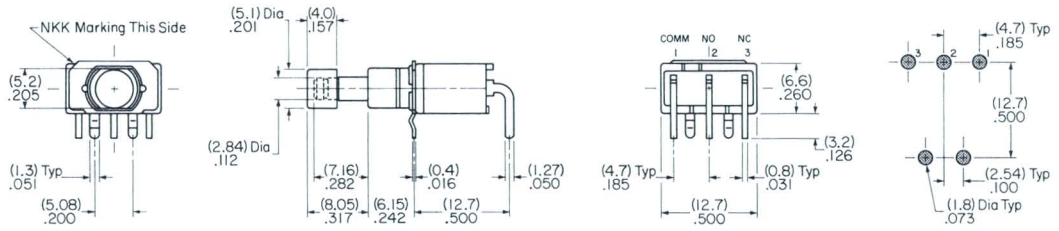
NKK SERIES M2 PUSHBUTTON SWITCHES

SUBMINIATURE/SNAP ACTION/WASHABLE/PCB MOUNT

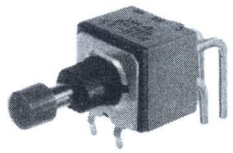
30 Right Angle PC Terminals/Single Pole

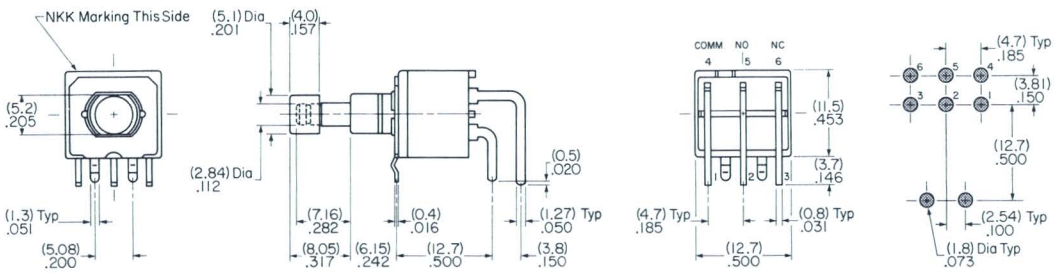




M2B15AA5G30-FC Model Shown

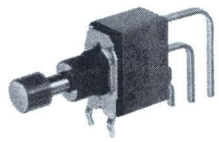
30 Right Angle PC Terminals/Double Pole

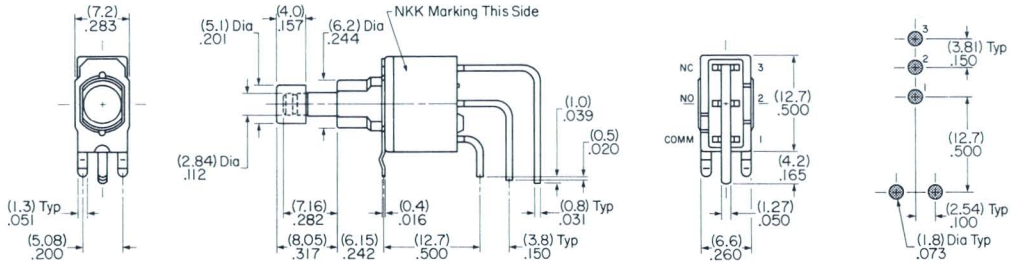




M2B25AA5G30-FC Model Shown

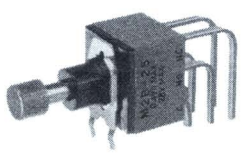
40 Vertical PC Terminals/Single Pole

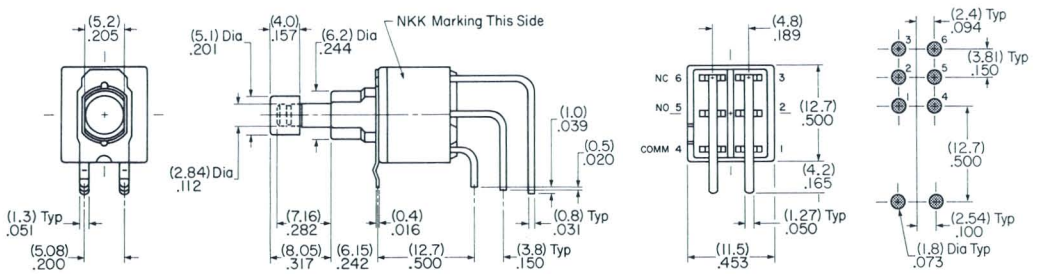




M2B15AA5G40-FC Model Shown

40 Vertical PC Terminals/Double Pole





M2B25AA5G40-FC Model Shown

NOTES

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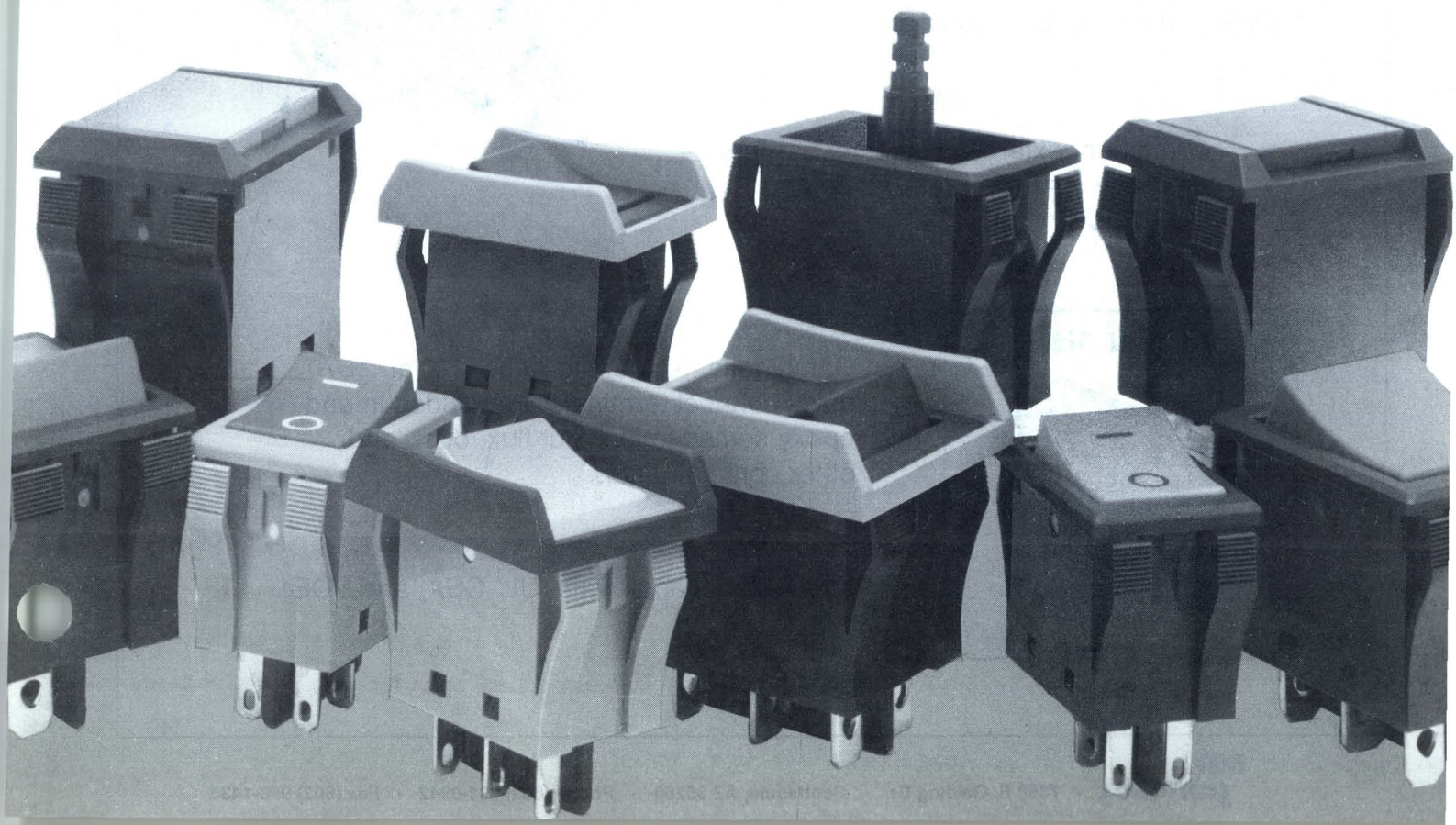
SERIES JW & JP

TV RATED SWITCHES

- ROCKERS
- PUSHBUTTONS



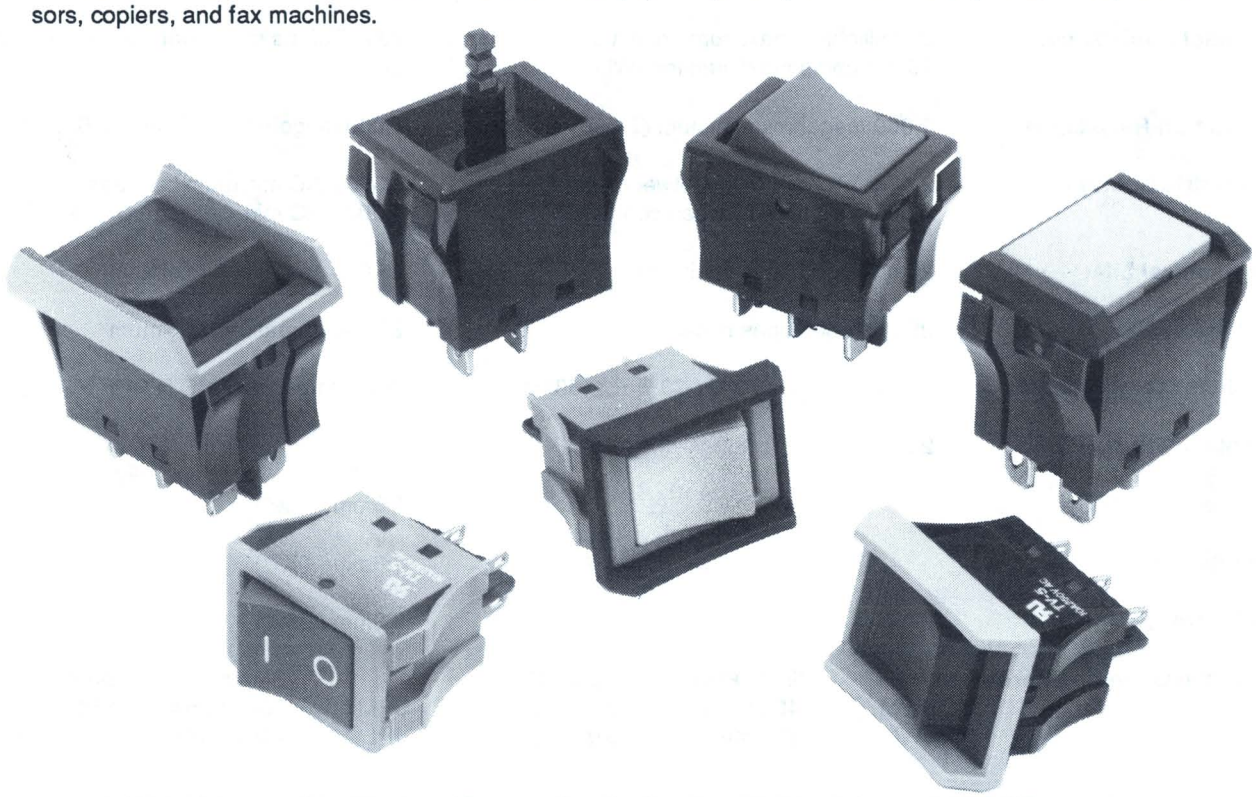
NKK SERIES JW & JP SWITCHES

TV-RATED/SNAP-IN MOUNT/ROCKERS & PUSHBUTTONS

APPLICATIONS

JW rockers are designed for applications where a high inrush current occurs but routine usage does not require high current. They are an ideal power source switch where a TV rating is required.

These switches are suited for use in audio and video equipment, factory automation equipment, word processors, copiers, and fax machines.



TV RATINGS

As required of TV ratings for UL and CSA, the JW & JP switches are capable of handling the initial high inrush characteristics of a tungsten filament lamp load on AC or DC voltage.

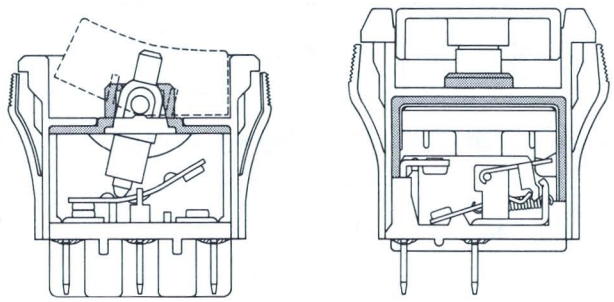
The table below shows the specifications met for both overload and endurance tests at 120V AC:

		Overload Test		Endurance Test	
Switch Model	TV Rating	Steady State Current (rms)	Minimum Inrush Current (peak)	Steady State Current (rms)	Minimum Inrush Current (peak)
JW-M	5	7.5A	111A	5A	78A
JP-M	5	7.5A	111A	5A	78A
JW-L	8	12.0A	163A	8A	117A
JP-L	8	12.0A	163A	8A	117A

Overload test is made for 50 operations.
Endurance test is made for 25,000 operations.

DUSTPROOF CONSTRUCTION

Interior seal of polyphenylene sulfide (PPS) to prevent intrusion of dust and other particles.



Epoxy sealed terminals also prevent intrusion of contaminants.

NKK SERIES JW & JP SWITCHES

TV-RATED/SNAP-IN MOUNT/ROCKERS & PUSHBUTTONS

GENERAL SPECIFICATIONS

	JW Rockers	JP Pushbuttons
Electrical Capacity: (Resistive Load)	M models: 10A @ 125/250V AC L models: 16A @ 125/250V AC	M models: 10A @ 125/250V AC L models: 16A @ 125/250V AC
Contact Resistance:	20 milliohms maximum for JWL 10 milliohms maximum for JWM	20 milliohms maximum for JPL & JPM
Insulation Resistance:	1,000 megohms minimum @ 500V DC	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum between contacts 4,000V AC min. between contacts & case	2,000V AC minimum between contacts 4,000V AC min. between contacts & case
Mechanical Life:	25,000 operations minimum	25,000 operations minimum
Electrical Life:	25,000 operations minimum	25,000 operations minimum
Ambient Temp. Range:	-25°C through +70°C (-13°F ~ +158°F)	-10°C through +70°C (+14°F ~ +158°F)
Angle of Throw:	26°	
Pretravel:		1.5mm (.059")
Overtravel:		1.8mm (.071")
Total Travel:		3.3mm (.130")

Nominal Operating Force:

	Single Pole	Double Pole
JWM	340 grams	720 grams
JWL	360 grams	690 grams

	Single Pole	Double Pole
JPM	360 grams	660 grams
JPL	460 grams	920 grams

MATERIALS & FINISHES

Housing/Frame	Polyamide
Barrier	Polyamide
Interior Seal	Polyphenylene sulfide
Movable Contacts	Silver alloy with silver plating
Stationary Contacts	Silver alloy with silver plating
Case/Base	Phenolic resin (UL-94V-0)
Terminals	Brass with silver plating

INTERNATIONAL APPROVALS

UL: File # 44145
Underwriters Laboratories Inc. recognizes JWL at 16A @ 125/250V AC & JWM at 10A @ 125/250V AC.

CSA: File #s LR23535 & LR56017
Canadian Standards Association certifies JWL at 16A @ 250V AC & JWM at 10A @ 250V AC.

VDE
Verband Deutscher Elektrotechniker of West Germany approves JW models at the following ratings: JWL ~ steady state 8A, inrush 128A, resistive 16A, & motor load 10A all at 250V AC; JWM ~ steady state 5A, inrush 80A, resistive 10A, & motor load 6A all at 250V AC.

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NKK SERIES JW ROCKER SWITCHES

TV-RATED/SNAP-IN MOUNT/MOLDED ROCKER

TYPICAL SWITCH ORDERING EXAMPLE

JW	L	2	2	R	C	A	—	

SIZE & RATING

M	Medium Size (TV5) 10A @ 125/250V AC
L	Large Size (TV8) 16A @ 125/250V AC

POLES

1	SPST SPDT
2	DPST DPDT

CIRCUITS

1	ON	NONE	OFF
2	ON	NONE	ON

FLANGE TYPES

R	Rocker with Flat Flange
B	Rocker with Barrier Flange

CAP COLORS

A	Black (std)
B	Ivory (std)
C	Red (std)
E	Amber
F	Green
G	Blue
H	Gray (std)

HOUSING COLORS

A	Black (std)
B	Ivory (std)
C	Red
H	Gray (std)

FLANGE COLORS

Flat Flange	
No Code	Same as Housing
Barrier Flange	
A	Black (std)
B	Ivory (std)
H	Gray (std)

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (JWL22RCA):

SERIES JW ROCKER

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

NKK SERIES JW ROCKER SWITCHES

TV-RATED/SNAP-IN MOUNT/MOLDED ROCKER

SIZES & RATINGS

M Medium Size
10A @ 125/250V AC
TV5 rated

L Large Size
16A @ 125/250V AC
TV8 rated

POLES AND CIRCUITS

POLE & THROW	MODEL	ROCKER POSITION & TERMINAL NUMBERS ( ) = Momentary: Down	Center	Up
SPST	JW11	ON	NONE	OFF
CONNECTED TERMINALS		1-1b	OPEN	OPEN
SCHEMATIC				
SPDT	JW12	ON	NONE	ON
CONNECTED TERMINALS		1-1b	OPEN	1-1a
SCHEMATIC				
DPST	JW21	ON	NONE	OFF
CONNECTED TERMINALS		1-1b 2-2b	OPEN	OPEN
SCHEMATIC				
DPDT	JW22	ON	NONE	ON
CONNECTED TERMINALS		1-1b 2-2b	OPEN	1-1a 2-2a
SCHEMATIC				

Terminal numbers are on the switch. Actuator positions oriented with switch part number facing front.

FLANGE TYPES

R Rocker with Flat Flange

Flat Flange type R is a molded, integral part of the switch housing. Black, ivory, & gray standard.

B Rocker with Barrier Flange

Barrier Flange type B designates that either barrier AT217 or AT218 is factory assembled. See Accessories section.

CAP & HOUSING COLORS

Cap Colors:				Housing Colors:	
A	Black *	F	Green	A	Black *
B	Ivory *	G	Blue	B	Ivory *
C	Red*	H	Gray *	C	Red
E	Yellow			H	Gray *

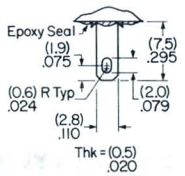
* indicates standard color.
Cap Material: Polyphenelene oxide Finish: Matte
Housing/Flange Material: Polyamide Finish: Matte

Note: On-off inscription, as illustrated here, is standard on DPST models (JWL21 & JWM21; inscription oriented for horizontal mounting).

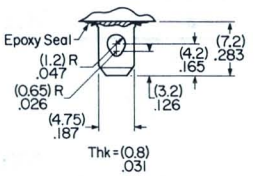
Inscriptions on other models are available on request.

MOUNTING SPECIFICATIONS

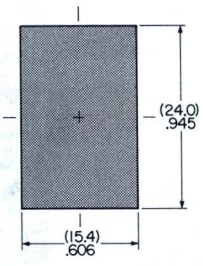
Soldering: 3 seconds @ 350°C
Wiring for JWM: .047" x .079" terminal hole accommodates 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires;
Wiring for JWL: the pear-shaped .094" dia./.052" dia. terminal hole accommodates 1 solid or stranded 12-gauge wire or 2 solid or stranded 18-gauge wires.

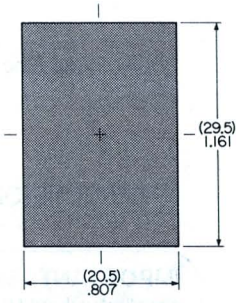


For JWM Rockers



For JWL Rockers





Panel Thickness Range:
Without Bezel: 1.0mm ~ 4.0mm (.039" ~ .158")
With Bezel: 0.6mm ~ 3.2mm (.024" ~ .126")

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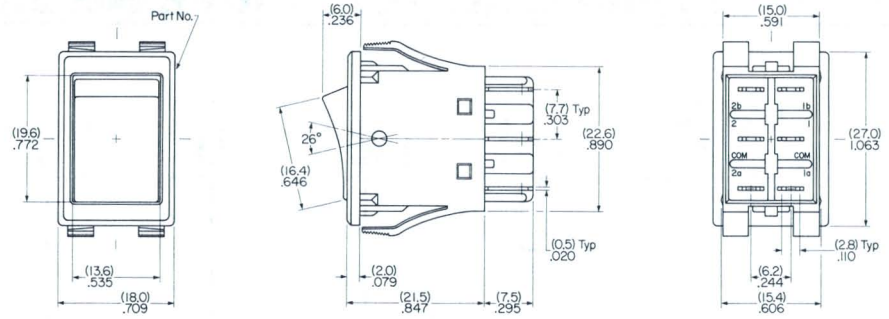
NKK SERIES JW ROCKER SWITCHES

TV-RATED/SNAP-IN MOUNT/MOLDED ROCKER

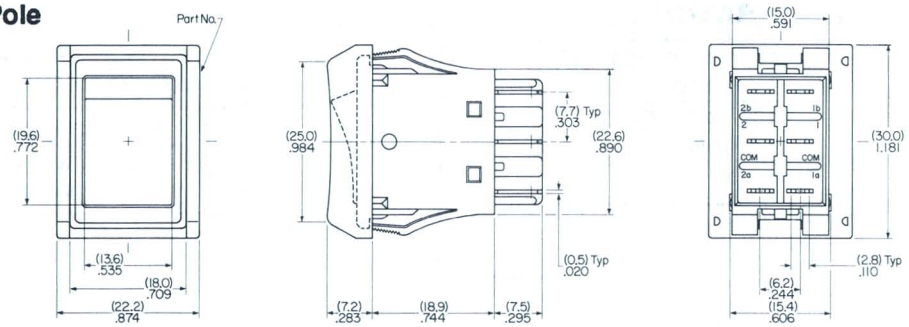
R Flat Flange 1 & 2 Pole
Medium Size 10 Amp



JWM12RAA Model Shown

Single pole models do not have terminals 2a, 2, & 2b; single throw models also do not have 1a & 2a.

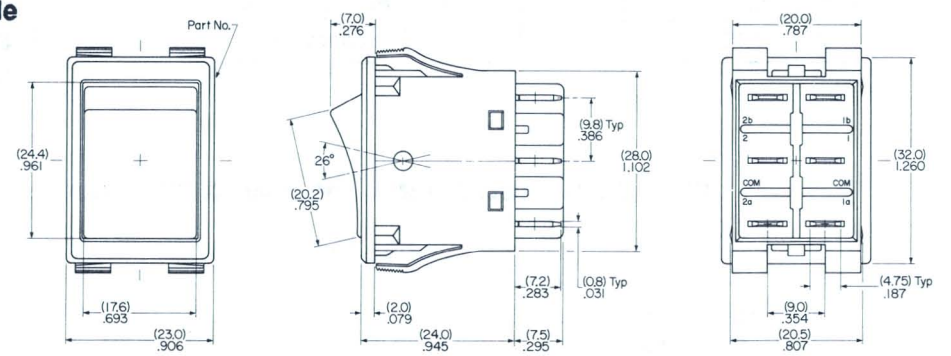
B Barrier Flange 1 & 2 Pole
Medium Size 10 Amp



JWM22BAA-H Model Shown

Single pole models do not have terminals 2a, 2, & 2b; single throw models also do not have 1a & 2a.

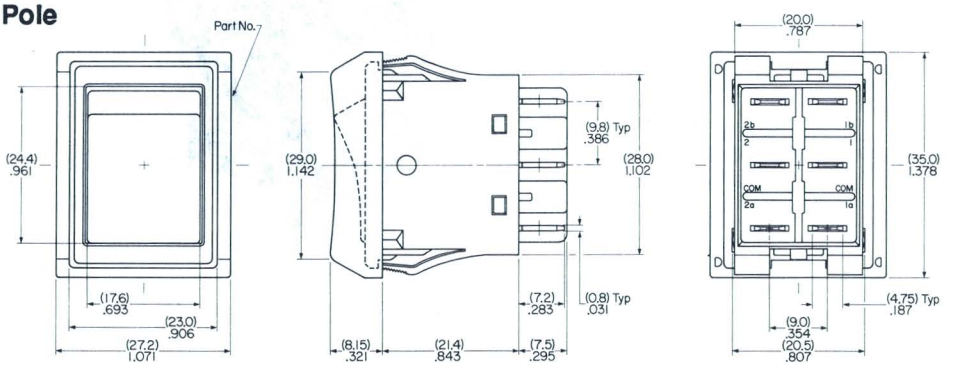
R Flat Flange 1 & 2 Pole
Large Size 16 Amp



JWL22RCA Model Shown

Single pole models do not have terminals 2a, 2, & 2b; single throw models also do not have 1a & 2a.

B Barrier Flange 1 & 2 Pole
Large Size 16 Amp



JWL12BCA-H Model Shown

Single pole models do not have terminals 2a, 2, & 2b; single throw models also do not have 1a & 2a.

NKK SERIES JP PUSHBUTTON SWITCHES

TV-RATED/SNAP ACTION/SNAP-IN MOUNT

TYPICAL SWITCH ORDERING EXAMPLE

JP	M	2	6	B	H

RATINGS

M	10A @ 125/250V AC TV5 rated
L	16A @ 125/250V AC TV8 rated
Same size body for both.	

ACTUATOR TYPES

B	Flat Cap w/Barrier Flange
P	Plunger with Flat Flange; cap not supplied w/plunger

POLES

1	SPST
2	DPST

CIRCUITS

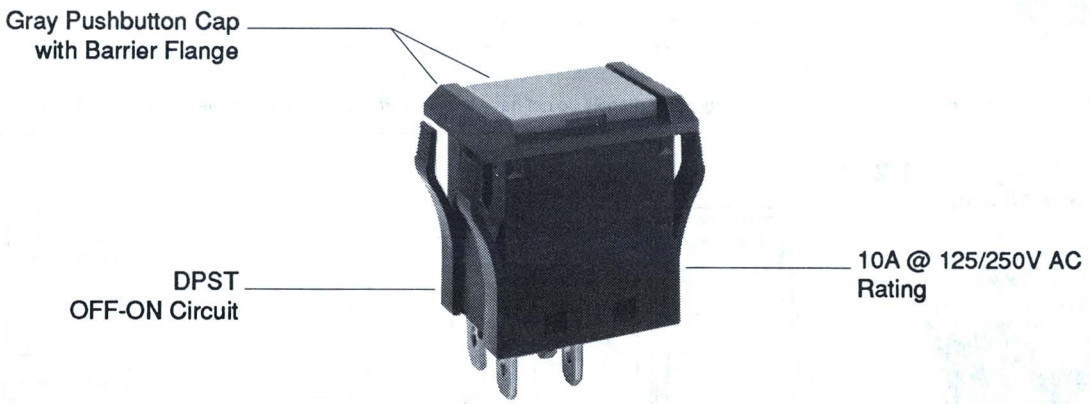
6	OFF	ON
(this circuit is alternate action)		

CAP COLORS

A	Black
B	Ivory
C	Red
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (JPM26BH) :

SERIES JP PUSHBUTTON



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NKK SERIES JP PUSHBUTTON SWITCHES

TV-RATED/SNAP ACTION/SNAP-IN MOUNT

RATINGS

M 10A @ 125/250V AC
TV5 rated

L 16A @ 125/250V AC
TV8 rated

POLES AND CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS: Normal	Down
SPST	JP16	OFF	ON
CONNECTED TERMINALS		OPEN	1-1a
SCHEMATIC			
DPST	JP26	OFF	ON
CONNECTED TERMINALS		OPEN	1-1a 2-2a
SCHEMATIC			

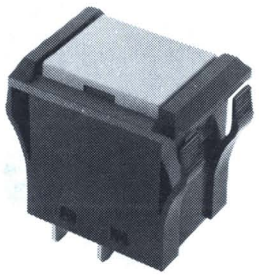
Terminal numbers are on the switch.

ACTUATOR TYPES

B **Flat Cap with Barrier Flange**

(cap details below)

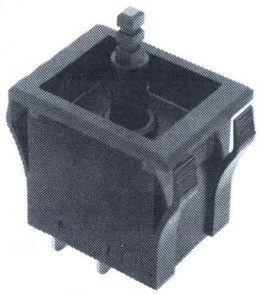
Body & barrier are black with matte finish.



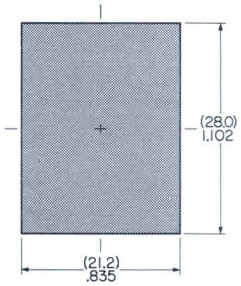
P **Plunger with Flat Flange**

(no cap supplied for plunger type actuator)

Body & barrier are black with matte finish.



CUTOUT & PANEL THICKNESS RANGE

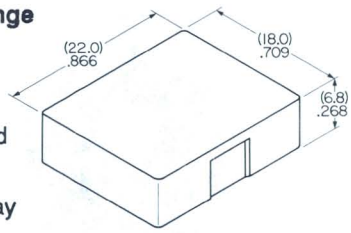


Panel Thickness Range applies to both JPM & JPL models.

1.0 ~ 4.0mm
(.039" ~ .157")

CAP COLORS

AT3021 Flat Cap for Actuator Type B with Barrier Flange



A Black
C Red
B Ivory
H Gray

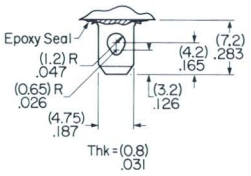
Cap Material: Polyphenelene oxide Cap Finish: Matte

SOLDERING & WIRING

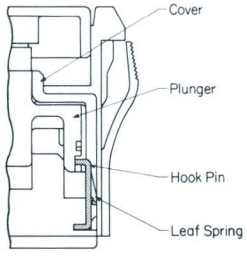
JPM Model & JPL Model

The pear-shaped .094" dia./.052" dia. terminal hole accommodates 1 solid or stranded 12-gauge wire or 2 solid or stranded 18-gauge wires.

Soldering:
3 seconds at 350°C



LATCHDOWN MECHANISM



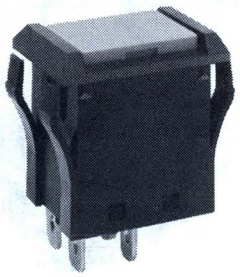
The latchdown feature on this alternate action device provides visible, audible, and tactile feedback. This design gives smooth, responsive operation.

The cap is flush with the barrier in normal position and 2.0mm (.079") below that in latchdown position.

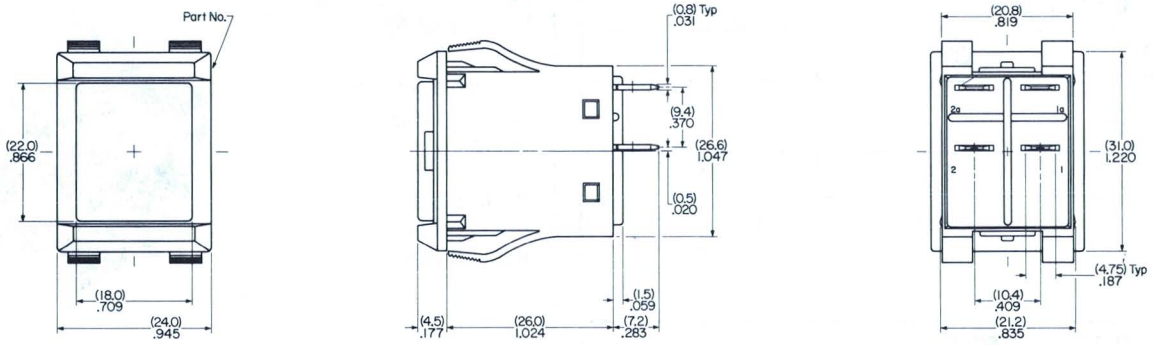
SERIES JP PUSHBUTTON SWITCHES

TV-RATED/SNAP ACTION/SNAP-IN MOUNT

B **Flat Cap with Barrier Flange**
JPM & JPL Models
Single & Double Pole



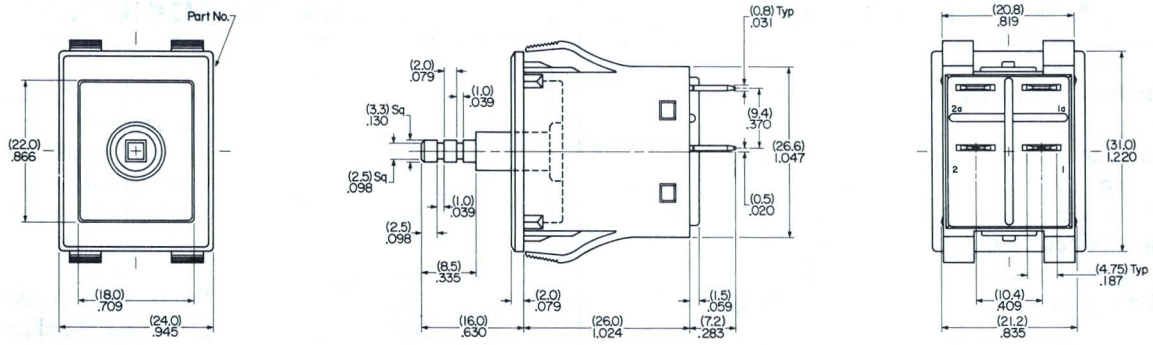
JPM26BH Model Shown



Single pole model does not have terminals 2 & 2a.

P **Plunger with Flat Flange**
JPM & JPL Models
Single & Double Pole

JPL16P Model Shown



Single pole model does not have terminals 2 & 2a.

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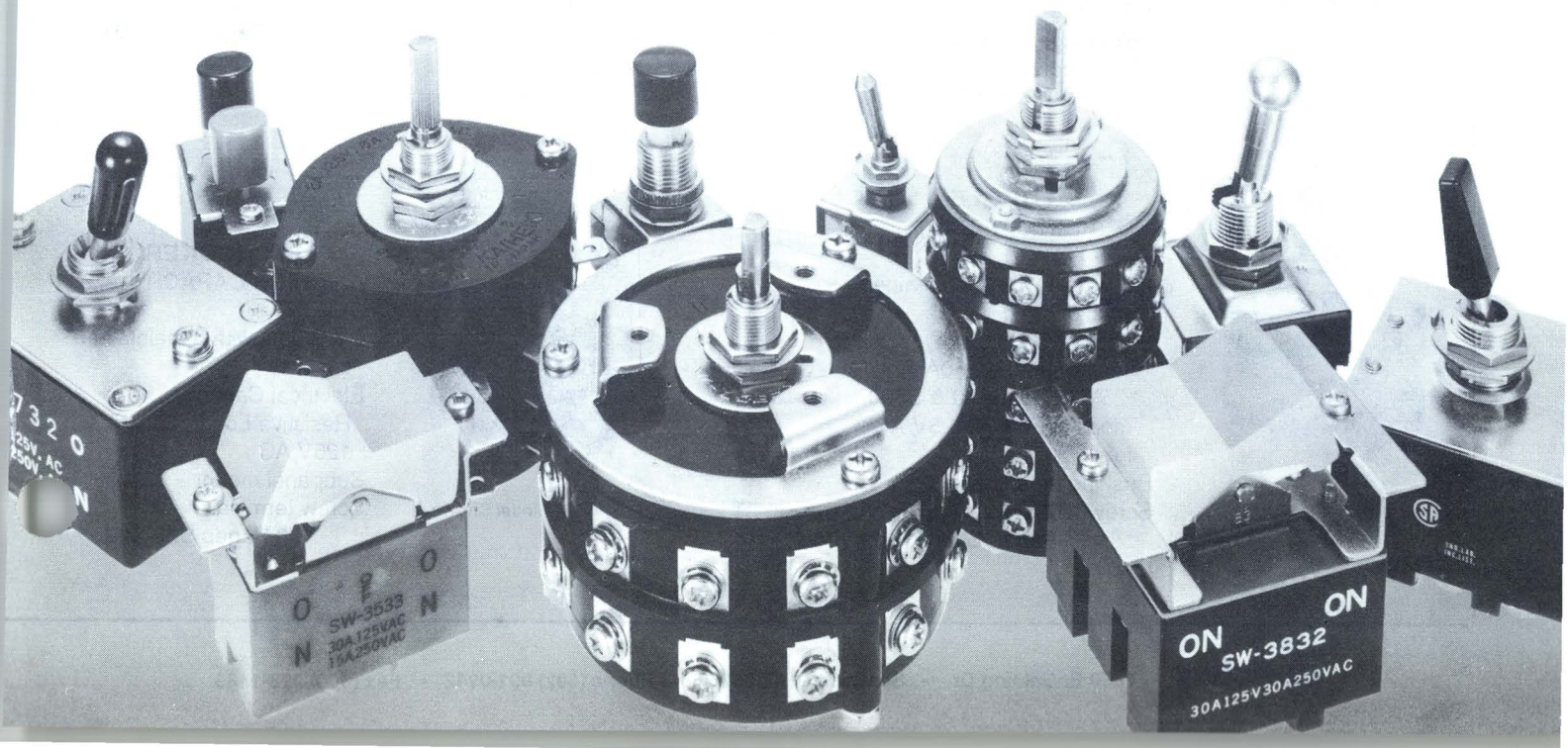
STANDARD & HIGH CAPACITY SWITCHES

• TOGGLES • ROCKERS
• PUSHBUTTONS • ROTARIES



NKK STANDARD &

TOGGLES/ROCKERS/

P2022 Model Shown

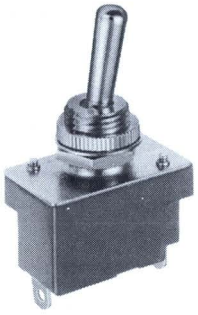
P TOGGLE & ROCKER
STANDARD SIZE

1 & 2 pole with 3 maintained circuits
Electrical Capacity:
Resistive Load - 10A @ 125V AC & 6A @ 250V AC
Inductive Load - 6A @ 125/250V AC
Motor Load - 400W @ 125V AC
Lamp Load -2-3A @ 125V AC
Bushing mount with 6mm or 12mm diameter bushings for toggles
Subpanel & flat frame mount for rockers
Solder lug, straight PC, & .187" quick connect terminals
UL, CSA, VDE, SEV, SEMKO, JETL
Pages S4-S6

S832D Model Shown

S & SW TOGGLE & ROCKER
HIGH CAPACITY AC/DC

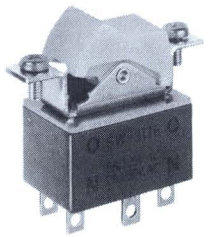
2 & 3 pole with 3 maintained circuits
Electrical Capacity:
Resistive Load - 15 through 30A @ 125V AC or 15A @ 125V DC
Inductive Load - 30A @ 125V AC or 5A @ 125V DC
Bushing mount for toggles or subpanel mount for rockers
Screw terminals
Pages S16-S18, S22-S23



S1A Model Shown

S TOGGLE
STANDARD SIZE

1 through 4 pole with 6 circuits
Electrical Capacity:
Resistive Load - 3 through 25A @ 125V AC
Bushing mount --- splashproof bushing available
Solder lug, screw, & quick connect terminals
Pages S7-S15



SW3116 Model Shown

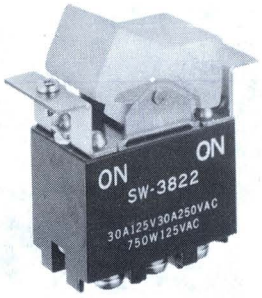
SW ROCKER
STANDARD SIZE

1 & 2 pole with 4 circuits
Electrical Capacity:
Resistive Load - 3A through 20A @ 125V AC
Subpanel mount
Solder lug terminals
Pages S20-S21

S821 Model Shown

S TOGGLE
HIGH CAPACITY

2 & 3 pole with 3 maintained circuits
Electrical Capacity:
Resistive Load - 30A @ 125V AC for S800 & S500 models; 50A @ 125V AC for S700 models
Bushing mount
Screw terminals
Pages S16-S19



SW3822 Model Shown

SW ROCKER
HIGH CAPACITY

2 & 3 pole with 3 maintained circuits
Electrical Capacity:
Resistive Load - 30A @ 125V AC
Subpanel mount
Screw terminals
Pages S22-S23

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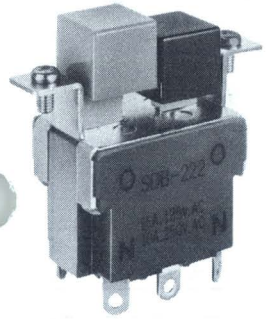
HIGH CAPACITY

PUSHBUTTONS/ROTARIES

SB285 Model Shown

SB PUSHBUTTON
STANDARD SIZE

1 & 2 pole with momentary or alternate action circuits
Electrical Capacity:
Resistive Load - 3 through 15A @ 125V AC
Bushing mount
Solder lug & screw terminals
Pages S24-S26



SDB222 Model Shown

SDB PUSHBUTTON
STANDARD SIZE

2 pole ON-ON circuit
Electrical Capacity:
Resistive Load - 15A @ 125V AC or 10A @ 250V AC
Flush panel, subpanel, & snap-in mounting
Solder lug terminals
Round & square caps of four different colors
Pages S27-S28

SCB25P10A-4CA Model Shown

SCB PUSHBUTTON
STANDARD SIZE

1 & 2 pole with momentary or alternate action
Electrical Capacity:
Resistive Load - 10-15A @ 125V AC
Inductive Load - 10A @ 125V AC
Bushing mount with 12 mm diameter bushing
Solder lug, screw, and .250" quick connect terminals
Rectangular or round caps & shrouds in various colors for attractive front panel appearance
Pages S29-S31

TS2 Model Shown

TS ROTARY
STANDARD SIZE

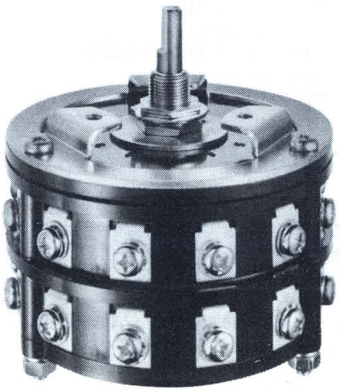
1 through 5 pole with 2 through 11 positions
Nonshorting
Electrical Capacity:
Resistive Load - 6A @ 125/250V AC
Bushing mount with 10mm diameter bushing
Flatted shafts
Screw terminals
Pages S35-S37

HS13-X Model Shown

HS16-2N Model Shown

HS ROTARY
STANDARD SIZE

1 through 6 pole with 2 through 11 positions
Shorting or nonshorting
Electrical Capacity:
Resistive Load - 6A @ 125V AC for HS 13; 12A @125V AC for HS 16
Bushing mount with 10mm diameter bushing
Round smooth, round knurled, or flatted shafts
Solder lug/.250" quick connect terminals
Pages S32-S33, S36-S37



PS2-N Model Shown

PS ROTARY
HIGH CAPACITY

1 through 5 pole with 2 through 11 positions
Nonshorting
Electrical Capacity:
Resistive Load - 30A @ 125/250V AC
Bushing mount with 10mm diameter bushing
Round knurled or flatted shafts
Screw terminals
Pages S34, S36-S37

NKK SERIES P TOGGLES & ROCKERS

STANDARD SIZE/1-2 POLE/BUSHING & SUBPANEL MOUNT

TYPICAL SWITCH ORDERING EXAMPLES

P20 [12] [ ] [Z] — [ ] [ ]

POLES & CIRCUITS				
11	SPST	ON	NONE	OFF
12	SPDT	ON	NONE	ON
13	SPDT	ON	OFF	ON
21	DPST	ON	NONE	OFF
22	DPDT	ON	NONE	ON
23	DPDT	ON	OFF	ON

TERMINALS	
NO CODE	Solder Lug
P	Straight PC
Z	.187" Quick Connect

CAPS	
For N Frame	
D	.365" Wide Rocker
E	.365" Wide Paddle
F	.453" Wide Rocker
G	.453" Wide Paddle
For Y Frame	
H	.598" Wide Paddle
J	.598" Wide Rocker

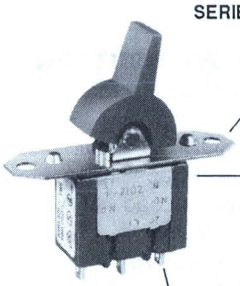
CAP COLORS	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

TOGGLES & BUSHINGS	
NO CODE	.512" White Cap w/6mm Bushing
B	.689" Large Bat w/12mm Bushing
D	.748" White Capped Column w/12mm Bushing
E	.450" Flatted w/6mm Bushing
L	.201" Dia. Locking Lever w/6mm Bushing
ROCKER/PADDLE FRAMES	
N	Frame for Small Caps
Y	Frame for Large Caps

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (P2012Z):
SERIES P TOGGLE

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (P2012N-EC):
SERIES P PADDLE



GENERAL SPECIFICATIONS

Electrical Capacity:	
Resistive Load	10A @ 125V AC or 6A @ 250V AC
Inductive Load	6A @ 125/250V AC for UL Approval
Motor Load	400W @ 125V AC
Lamp Load	2A @ 125V AC for ON-OFF-ON circuits 3A @ 125V AC for other circuits
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum between contacts 4,000V AC minimum between contacts and case
Mechanical Life:	100,000 operations minimum for toggles 50,000 operations minimum for paddles & rockers
Electrical Life:	25,000 operations minimum
Ambient Temp Range:	- 10°C through +70°C (+14°F through +158°F)
Angle of Throw:	25°

INTERNATIONAL RECOGNITION, APPROVAL, ETC.

UL E44145
10A @ 125V AC & 6A @ 250V AC Rating 1 & 2 Pole Models All Circuits
Solder Lug, PC, & Quick Connect Terminals All Toggle Options

CSA LR23535 & LR56017
10A @ 125V AC & 6A @ 250V AC Rating 1 & 2 Pole Models All Circuits
Solder Lug, PC, & Quick Connect Terminals All Toggle Options

SEMKO: 8438164 forP2021, 2022, 2023; **8524080** for P2011, 2012; and **8525184** for P2013 **SEV: 79.13166.01 VDE: 33306 JETL** for P2013
10A @ 125V AC & 6A @ 250V AC Rating
Solder Lug , PC, & Quick Connect Terminals All Toggle Options

POLES & CIRCUITS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS Down (Keyway)	Center	Up
SPST	P2011	ON	NONE	OFF
CONNECTED TERMINALS		1-1b	OPEN	OPEN
SCHEMATIC		1 (COMM) 1b		
SPDT	P2012	ON	NONE	ON
	P2013	ON	OFF	ON
CONNECTED TERMINALS		1-1b	OPEN	1-1a
SCHEMATIC		1a 1 (COMM) 1b		
DPST	P2021	ON	NONE	OFF
CONNECTED TERMINALS		1-1b 2-2b	OPEN	OPEN
SCHEMATIC		1 (COMM) 2 1b 2b		
DPDT	P2022	ON	NONE	ON
	P2023	ON	OFF	ON
CONNECTED TERMINALS		1-1b 2-2b	OPEN	1-1a 2-2a
SCHEMATIC		1 (COMM) 2 1a 1b 2a 2b		

Terminal numbers are on the switch.

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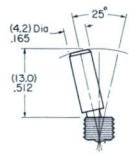
SERIES P TOGGLES & ROCKERS

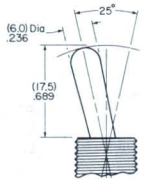
STANDARD SIZE/1-2 POLE/BUSHING & SUBPANEL MOUNT

TOGGLES WITH BUSHINGS AND ROCKER/PADDLE FRAMES

NO CODE .512" White Cap w/6mm Bushing

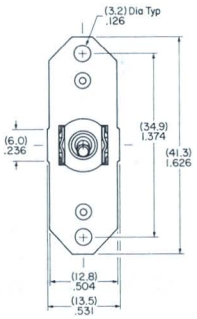


B .689" Large Bat w/12mm Bushing

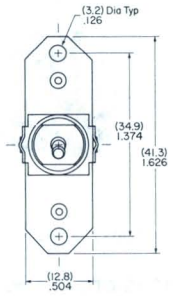


Cap AT406

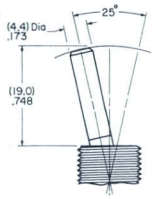
N Frame for Small Actuator



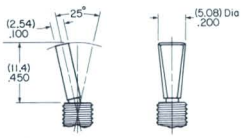
Y Frame for Large Actuator



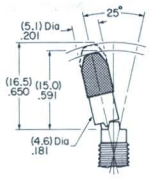
D .748" White Capped Column w/12mm Bushing



E .450" Flatted w/6mm Bushing



L .201" Dia. Locking Lever w/6mm Bushing

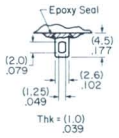


Cap AT427

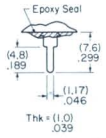
TERMINALS

NO CODE Solder Lug

Soldering Limits: 3 sec at 350°C; 5 sec at 270°C
Wiring: .049" X .079" holes accommodate;1 solid or stranded18-gg wire or 2 solid or stranded 20-gg wires.

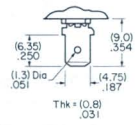


P Straight PC



Z .187" Quick Connect

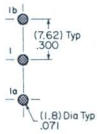
Matching receptacles available from AMP, Hollingsworth, and other manufacturers.



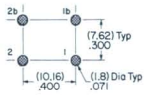
PC BOARD MOUNTING

SPST

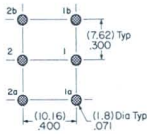
SPDT



DPST



DPDT



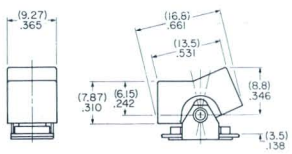
HARDWARE & HARDWARE KITS

Standard Hardware
For 6mm Bushing: 1 AT507 , 1 AT509, & 2 AT513
For 12mm Bushing 1 AT503, 1 AT506, 1 AT508, & 1 AT527

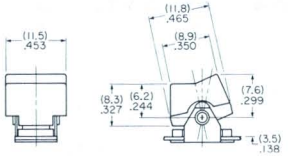
Hardware Kits
Kit HK-1 for N Frame & Kit HK-2 for Y Frame; Kits include: 2 each stainless steel screws, nuts, & lockwashers & 2 aluminum or nylon standoffs; details in M Series rocker section for TN & TY frames.

ROCKER/PADDLE CAPS

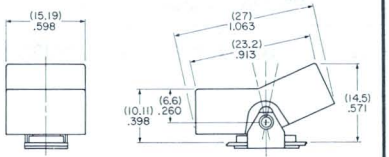
D AT4148 .365" Wide Rocker for N Frame



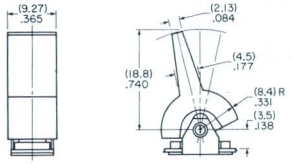
F AT4150 .453" Wide Rocker for N Frame



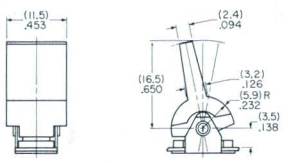
J AT4156 .598" Wide Rocker for Y Frame



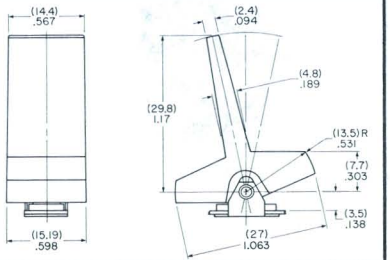
E AT4149 .365" Wide Paddle for N Frame



G AT4151 .453" Wide Paddle for N Frame



H AT4157 .598" Wide Paddle for Y Frame



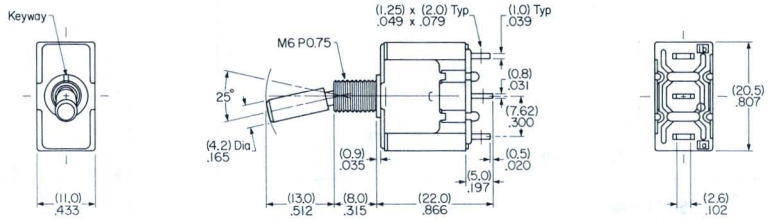
Material: Nylon **Colors Available:** **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

NKK SERIES P TOGGLES & ROCKERS

STANDARD SIZE/1-2 POLE/BUSHING & SUBPANEL MOUNT

Dimensions for P2011 ~ P2013 (with 6mm Bushing)

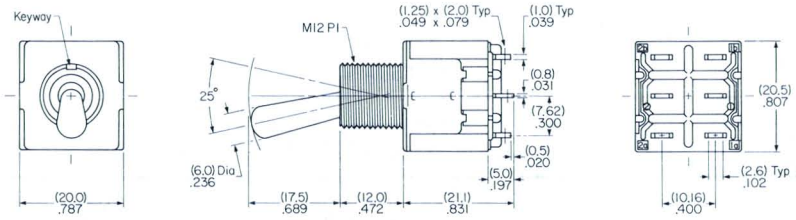
P2012 Model Shown



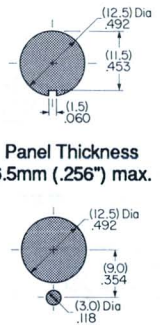
P2011 models do not have terminal 1a.

Dimensions for P2021 ~ P2023 (with 12mm Bushing)

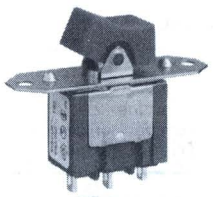
P2022B Model Shown



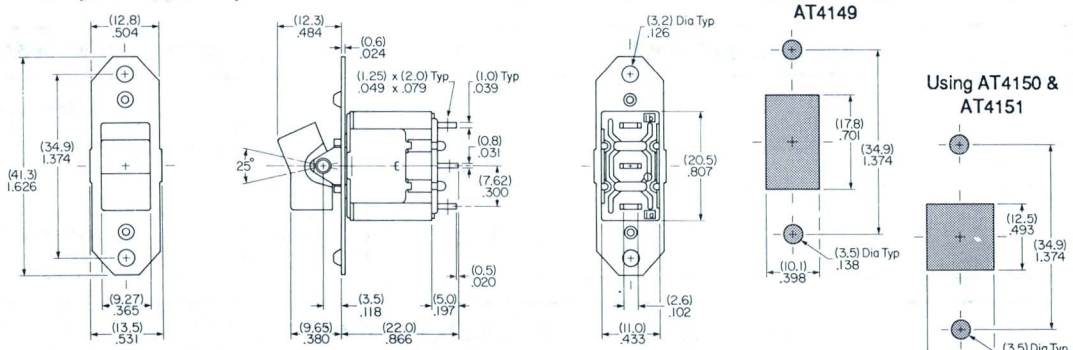
P2021 models do not have terminals 1a & 2a.



Dimensions for P2011 ~ P2023 (with N Frame)

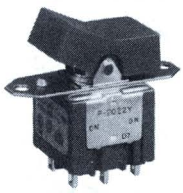


P2012N-DC Model Shown

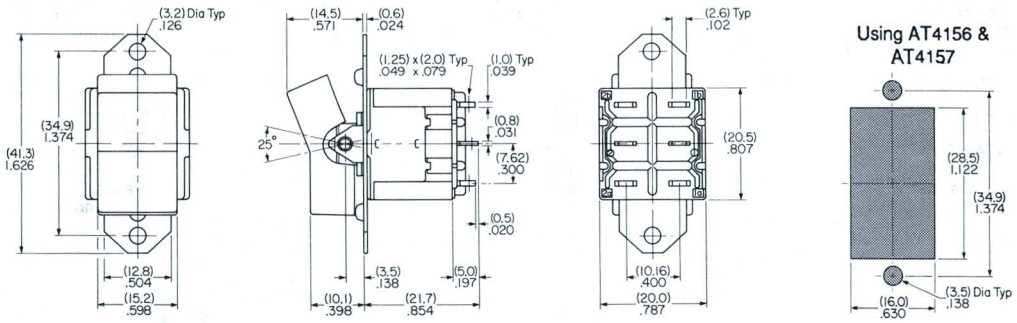


P2011 & P2021 models do not have terminals 1a & 2a.

Dimensions for P2011 ~ P2023 (with Y Frame)



P2022Y-JC Model Shown



P2011 & P2021 models do not have terminals 1a & 2a.

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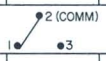
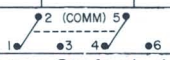
NKK SERIES S TOGGLE SWITCHES

LOW CAPACITY/1 & 2 POLE/BUSHING MOUNT

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS: Down (Keyway)	Center	Up	ELECTRICAL CAPACITY: Resistive AC 125V	Resistive AC 250V	Resistive DC 30V	Inductive AC 125V PF 0.6	TERMINALS: Solder Lug	Screw	Quick Connect	TOGGLES: Bat	Plastic Paddle	Fluo-res-cent Tip Paddle
SPST	S211	ON	NONE	OFF	3A	1.5A	1.5A	1.5A	X	---		X		
	S211T	ON	NONE	OFF	3A	1.5A	1.5A	1.5A	---	X		X		
	S1001	ON	NONE	OFF	6A	---	5A	3A	X	---		X		
	S1051X	ON	NONE	OFF	3A	---	3A	1.5A	flush	---		X		
	S1051Y	ON	NONE	OFF	3A	---	3A	1.5A	X	---		X		
CONNECTED TERMINALS		1-2	OPEN	OPEN	SCHEMATIC:									
2 CIRCUIT	S1002	ON	NONE	ON	6A	---	5A	3A	X			X		
	S1052X	ON	NONE	ON	3A	---	3A	1.5A	flush			X		
	S1052Y	ON	NONE	ON	3A	---	3A	1.5A	X			X		
CONNECTED TERMINALS		1-2	OPEN	3-4	SCHEMATIC:									
SPDT	S4012	ON	NONE	ON	6A	---	4A	---	X			X		
CONNECTED TERMINALS		2-3	OPEN	2-1	SCHEMATIC: 									
DPST	S114	ON	NONE	OFF	5A	---	5A	3A	X			X		
CONNECTED TERMINALS		2-1 5-4	OPEN	OPEN	SCHEMATIC:									
DPDT	S116	ON	NONE	ON	5A	2A	5A	3A	X			X	---	---
	S116R	ON	NONE	ON	5A	2A	5A	3A	X			---	X	---
	S116RN	ON	NONE	ON	5A	2A	5A	3A	X			---	---	X
CONNECTED TERMINALS		2-1 5-4	OPEN	2-3 5-6	SCHEMATIC: 									

Terminal numbers not on S1000 models. UL Recognized: S4012. CSA Certified: S211, S1001/1002, S1051/1052. See page S14 for plastic paddle dimensions.

GENERAL SPECIFICATIONS

Contact Resistance: 10 milliohms maximum

Insulation Resistance: 200 megohms minimum @ 500V DC for S200s, 100s, & 4012
1,000 megohms minimum @ 500V DC for S1000s

Dielectric Strength: 1,000V AC minimum for S4012
1,500V AC minimum for S200s, 100s, & 1000s

Mechanical Life: 30,000 operations minimum for S200s, 100s, 1051s, 1052s, & 4012
50,000 operations minimum for S1001 & 1002

Electrical Life: 10,000 operations minimum for S200s, 100s, 1051s, 1052s, & 4012
25,000 operations minimum for S1001 & 1002

Ambient Temp Range: -10°C through +70°C (+14°F through +158°F)

Angle of Throw: 25° for S100s 35° for S1000s
36° for S200s 18° for S4012

TWO-CIRCUIT CONTACTS

Models S1002, S1052X and S1052Y have the terminals 1-2 or 3-4 connected upon contact. This arrangement allows switching from one source current to another which, in turn, makes it possible to switch from one load to another.

TERMINAL DETAILS FOR ALL S SERIES TOGGLES

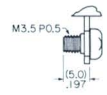
NO CODE Solder Lug

SOLDERING TEMPERATURE LIMITS
3 seconds at 350°C
5 seconds at 270°C

WIRING SPECIFICATIONS

Series	Hole Diameter	Solid or Stranded
S114,116	2.0mm/.079"	1 14-gauge
S300s	3.2mm/.126"	1 10-gauge
S330s & all others	2.4mm/.094"	1 12-gauge
S4012	1.1 X 2mm/ .043 X .079"	2 20-gauge

T Screw (Terminal hardware supplied)

S30 & S40 

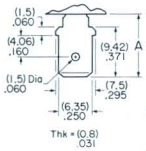
S300

SCREWS & TERMINAL HARDWARE

Model	Threading Size	Hardware Part No. & Description
S30Ts,40Ts	M3.5 x 5	AT082A
S200s	M3 x 4	AT082E
S301T-309T	M3.5 x 5	AT082A w/ lockwasher
S330s	M3.5 x 5	AT082A
S400s, 500s	M4 x 5	AT082B w/ lockwasher
S732	M6 x 8 & cup washer	AT082D w/ locking ring
S800s	M4.5 x 6	AT082C w/ locking ring

F Quick Connect

Dimension "A"



11mm/.433"	S25, S28, S31-39, S301-309, S338, S421-429
11.7mm/.461"	S1-9, S21
11.8mm/.465"	S6-7, S29, S41-49, S331-332, S335

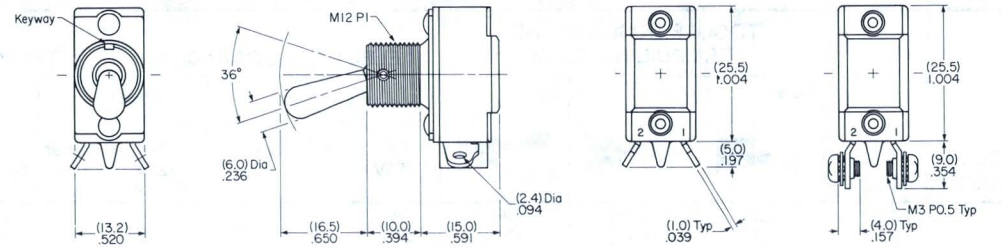
.250" width corresponds to AMP 250 Series receptacles

NKK SERIES S TOGGLE SWITCHES

LOW CAPACITY/1 & 2 POLE/BUSHING MOUNT

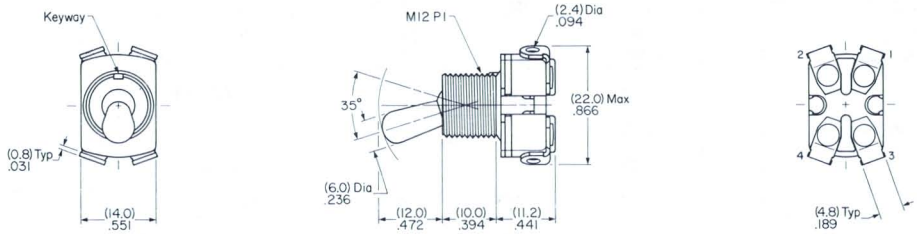
Dimensions for S211 ~ S211T

S211 Model Shown



Dimensions for S1001 & S1002

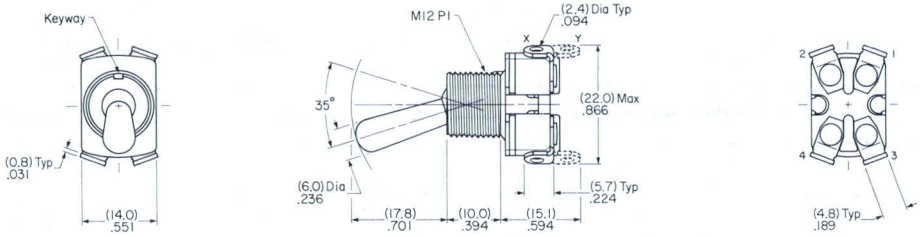
S1001 Model Shown



S1001 does not have terminals 3 & 4.

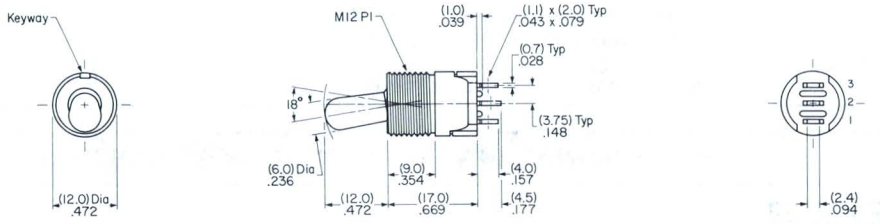
Dimensions for S1051X, S1051Y, S1052X, & S1052Y

S1051Y Model Shown

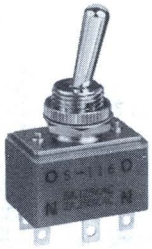


Dimensions for S4012

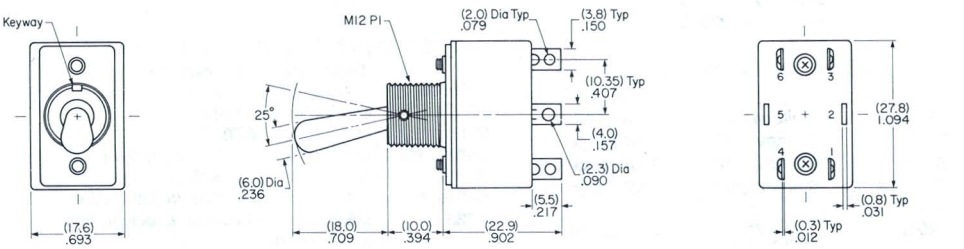
S4012 Model Shown



Dimensions for S114 ~ S116RN



S116 Model Shown



S114 does not have terminals 3 & 6.

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NKK SERIES S TOGGLE SWITCHES

MEDIUM RATED/STANDARD SIZE/1 & 2 POLE

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS ( ) = Momentary: Down (Keyway)	Center	Up	ELECTRICAL CAPACITY: Resistive AC 125V	Resistive AC 250V	Resistive DC 30V	Inductive AC 125V	Inductive AC 125V PF 0.6	Lamp AC 125V	TERMINALS: Solder Lug	Screw	Quick Connect	TOGGLES: Bat	Lever Lock	Splash-proof Bushing
SPST	S1A	ON	NONE	OFF	15A	6A	20A	---	8A	---	X		---	X	√	---
	S1AW	ON	NONE	OFF	15A	6A	20A	200W	---	4A	X		---	X	---	X
	S1B	ON	NONE	OFF	10A	5A	10A	---	5A	---	X		---	X	---	---
	S1BW	ON	NONE	OFF	10A	5A	10A	---	---	---	X		---	X	---	X
	S1F	ON	NONE	OFF	15A	6A	20A	---	8A	---	---		X	X	---	---
CONNECTED TERMINALS		1-3	OPEN	OPEN	SCHEMATIC:											
SPDT	S2A	ON	NONE	ON	15A	6A	20A	---	8A	---	X		---	X	√	---
	S2AW	ON	NONE	ON	15A	6A	20A	200W	---	4A	X		---	X	---	X
	S2B	ON	NONE	ON	10A	5A	10A	---	5A	---	X		---	X	---	---
	S2BW	ON	NONE	ON	10A	5A	10A	---	---	---	X		---	X	---	X
	S2F	ON	NONE	ON	15A	6A	20A	---	8A	---	---		X	X	---	---
	S3A	ON	OFF	ON	15A	6A	20A	---	8A	---	X		---	X	√	---
	S3AW	ON	OFF	ON	15A	6A	20A	200W	---	5A	X		---	X	---	X
	S3B	ON	OFF	ON	5A	3A	---	---	---	---	X		---	X	---	---
	S3BW	ON	OFF	ON	5A	3A	---	---	---	---	X		---	X	---	X
	S3F	ON	OFF	ON	15A	6A	20A	---	8A	---	---		X	X	---	---
	S5AW	ON	NONE	(ON)	15A	6A	20A	200W	---	---	X			X	---	X
	S8AW	(ON)	OFF	(ON)	15A	6A	20A	200W	---	---	X			X	---	X
	S9AW	ON	OFF	(ON)	15A	6A	20A	200W	---	---	X			X	---	X
CONNECTED TERMINALS		2-3	OPEN	2-1	SCHEMATIC:											
DPST	S21A	ON	NONE	OFF	15A	15A	15A	---	8A	---	X		---	X	√	---
	S21AW	ON	NONE	OFF	15A	15A	15A	200W	---	4A	X		---	X	---	X
	S21B	ON	NONE	OFF	10A	5A	10A	---	5A	---	X		---	X	---	---
	S21BW	ON	NONE	OFF	10A	5A	10A	---	---	---	X		---	X	---	X
	S21F	ON	NONE	OFF	15A	15A	15A	---	8A	---	---		X	X	---	---
CONNECTED TERMINALS		1-3 4-6	OPEN	OPEN	SCHEMATIC:											
DPDT	S6A	ON	NONE	ON	20A	10A	20A	---	8A	---	X		---	X	√	---
	S6AW	ON	NONE	ON	20A	10A	20A	---	---	---	X		---	X	---	X
	S6B	ON	NONE	ON	10A	5A	10A	---	5A	---	X		---	X	---	---
	S6BW	ON	NONE	ON	10A	5A	10A	---	---	---	X		---	X	---	X
	S6F	ON	NONE	ON	20A	10A	20A	---	8A	---	---		X	X	---	---
	S7A	ON	OFF	ON	20A	10A	20A	---	8A	---	X		---	X	√	---
	S7AW	ON	OFF	ON	20A	10A	20A	---	---	---	X		---	X	---	X
	S7B	ON	OFF	ON	5A	3A	5A	---	5A	---	X		---	X	---	---
	S7BW	ON	OFF	ON	5A	3A	5A	---	---	---	X		---	X	---	X
	S7F	ON	OFF	ON	20A	10A	20A	---	8A	---	---		X	X	---	---
	S25AW	ON	NONE	(ON)	15A	6A	20A	---	---	---	X		---	X	---	X
	S28AW	(ON)	OFF	(ON)	15A	6A	20A	---	---	---	X		X	X	---	X
	S29AW	ON	OFF	(ON)	15A	6A	20A	---	---	---	X		---	X	---	X
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4	SCHEMATIC:											

Terminal numbers are on the switch. √ = lever lock with panel seal; ordering suffix is L; for example, S1AL; see page S14 for drawings.

GENERAL SPECIFICATIONS

Contact Resistance: 10 milliohms maximum
Insulation Resistance: 1,000 megohms minimum @ 500V DC
Dielectric Strength: 2,000V AC minimum
Mechanical Life: 30,000 operations minimum for S5AW, 8AW, 9AW, 25AW, 28AW, 29AW
50,000 operations minimum for all other models
Electrical Life: 25,000 operations minimum
10,000 operations minimum with lamp load
Ambient Temp Range: -30°C through +70°C (+22°F through +158°F) for Splashproof models
-10°C through +70°C (-14°F through +158°F) for all other models

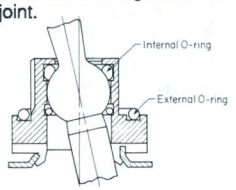
Angle of Throw: *a*

20°	21°	22°	24°	25°	28°
S5AW	S6A	S6AL	S1AL, S2AL	S1A/B/F	S3AL, S7AL
S25AW	S6B	S6AW/BW	S1AW/BW	S2A/B/F	S3AW/BW
	S6F	S21AW/BW	S2AW/BW	S3A/B/F	S7A/B/F
	S21A	S28AW	S8AW, S9AW		S7AW/BW
	S21B	S29AW	S21AL		

UL & CSA: See Supplement pages for specific models.

SPLASHPROOF BUSHING

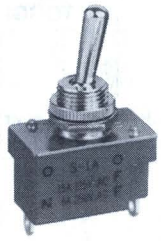
W Any model with W in the part number has a splashproof bushing that includes two nitrile butadiene rubber seals which protect the contact mechanism: (1) the external o-ring in a trough at the top of the bushing collar and (2) the internal o-ring inside the bushing above the toggle joint.

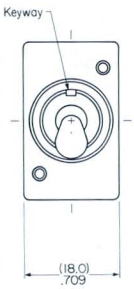


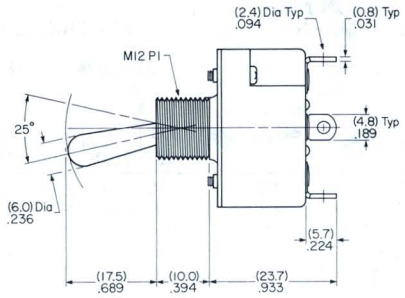
NKK SERIES S TOGGLE SWITCHES

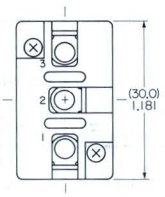
MEDIUM RATED/STANDARD SIZE/1 & 2 POLE

Dimensions for S1A/B/F, S2A/B/F, & S3/A/B/F





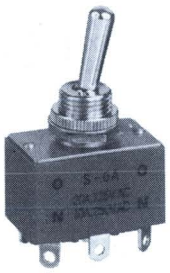


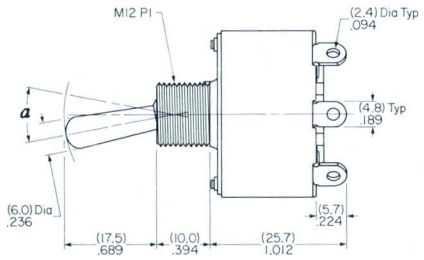


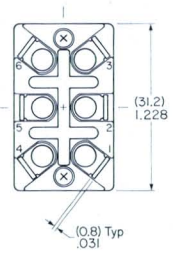
S1A Model Shown

S1 models do not have Terminal 2.

Dimensions for S21A/B, S6A/B/F, & S7A/B/F



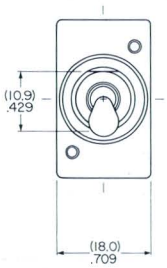


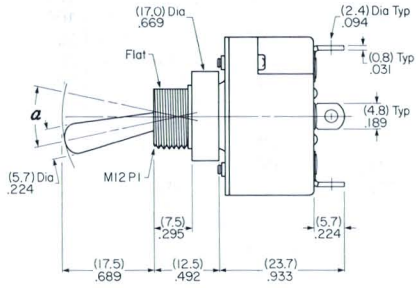


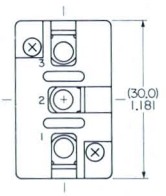
S6A Model Shown

S21 models do not have Terminals 2 & 5.

Dimensions for S1AW/BW, S2AW/BW, S3AW/BW, S5AW, S8AW, & S9AW



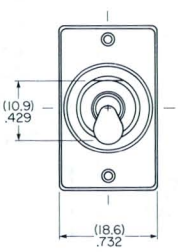


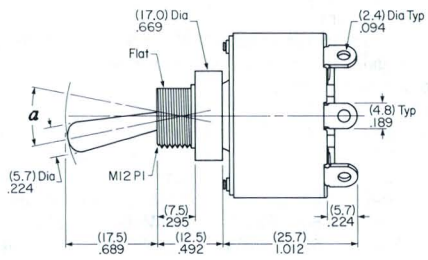


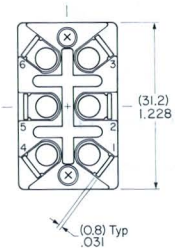
S2AW Model Shown

S1 models do not have Terminal 2.

Dimensions for S21AW/BW, S6AW/BW, S7AW/BW, S25AW, S28AW, & S29AW







S6AW Model Shown

S21 models do not have Terminals 2 & 5.

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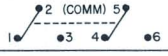
NKK SERIES S TOGGLE SWITCHES

HIGH RATED/STANDARD SIZE/1 & 2 POLE

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS ( ) = Momentary: Down (Keyway)	Center	Up	ELECTRICAL CAPACITY: Resistive AC 125V	Resistive AC 250V	Resistive DC 30V	Inductive AC 125V PF 0.6	TERMINALS: Solder Lug	Screw	Quick Connect	TOGGLES: Bat	Plastic Paddle	Fluorescent Tip Paddle
SPST	S301	ON	NONE	OFF	15A	6A	20A	10A	X	---	---	X		
	S301F	ON	NONE	OFF	15A	6A	20A	10A	---	---	X	X		
	S301T	ON	NONE	OFF	15A	6A	20A	10A	---	X	---	X		
CONNECTED TERMINALS		1-3	OPEN	OPEN	SCHEMATIC:									
SPDT	S302	ON	NONE	ON	15A	6A	20A	10A	X	---	---	X		
	S302F	ON	NONE	ON	15A	6A	20A	10A	---	---	X	X		
	S302T	ON	NONE	ON	15A	6A	20A	10A	---	X	---	X		
	S303	ON	OFF	ON	15A	6A	20A	10A	X	---		X		
	S303T	ON	OFF	ON	15A	6A	20A	10A	---	X		X		
	S305	ON	NONE	(ON)	15A	6A	20A	8A	X	---		X		
	S305T	ON	NONE	(ON)	15A	6A	20A	8A	---	X		X		
	S308	(ON)	OFF	(ON)	15A	6A	20A	8A	X	---		X		
	S308T	(ON)	OFF	(ON)	15A	6A	20A	8A	---	X		X		
	S309	ON	OFF	(ON)	15A	6A	20A	8A	X	---		X		
	S309T	ON	OFF	(ON)	15A	6A	20A	8A	---	X		X		
CONNECTED TERMINALS		2-3	OPEN	2-1	SCHEMATIC:									
DPST	S331	ON	NONE	OFF	25A	25A	25A	10A	X	---	---	X	---	---
	S331F	ON	NONE	OFF	25A	25A	25A	10A	---	---	X	X	---	---
	S331R	ON	NONE	OFF	25A	25A	25A	10A	X	---	---	---	X	---
	S331RN	ON	NONE	OFF	25A	25A	25A	10A	X	---	---	---	---	X
	S331T	ON	NONE	OFF	15A	15A	15A	10A	---	X	---	X	---	---
CONNECTED TERMINALS		1-3 4-6	OPEN	OPEN	SCHEMATIC:									
DPDT	S332	ON	NONE	ON	25A	15A	25A	10A	X	---	---	X	---	---
	S332F	ON	NONE	ON	25A	15A	25A	10A	---	---	X	X	---	---
	S332R	ON	NONE	ON	25A	15A	25A	10A	X	---	---	---	X	---
	S332RN	ON	NONE	ON	25A	15A	25A	10A	X	---	---	---	---	X
	S332T	ON	NONE	ON	15A	15A	15A	10A	---	X	---	X	---	---
	S333	ON	OFF	ON	25A	15A	25A	10A	X	---	---	X	---	---
	S333F	ON	OFF	ON	25A	15A	25A	10A	---	---	X	X	---	---
	S333R	ON	OFF	ON	25A	15A	25A	10A	X	---	---	---	X	---
	S333RN	ON	OFF	ON	25A	15A	25A	10A	X	---	---	---	---	X
	S333T	ON	OFF	ON	15A	15A	15A	10A	---	X	---	X	---	---
	S335	ON	NONE	(ON)	15A	6A	20A	8A	X	---	---	X	---	---
	S335F	ON	NONE	(ON)	15A	6A	20A	8A	---	---	X	X	---	---
	S335T	ON	NONE	(ON)	15A	6A	20A	8A	---	X	---	X	---	---
	S338	(ON)	OFF	(ON)	15A	6A	20A	8A	X	---		X	---	---
	S338R	(ON)	OFF	(ON)	15A	6A	20A	8A	X	---		---	X	---
	S338RN	(ON)	OFF	(ON)	15A	6A	20A	8A	X	---		---	---	X
	S338T	(ON)	OFF	(ON)	15A	6A	20A	8A	---	X		X	---	---
	S339	ON	OFF	(ON)	15A	6A	20A	8A	X	---		X	---	---
	S339R	ON	OFF	(ON)	15A	6A	20A	8A	X	---		---	X	---
	S339RN	ON	OFF	(ON)	15A	6A	20A	8A	X	---		---	---	X
	S339T	ON	OFF	(ON)	15A	6A	20A	8A	---	X		X	---	---
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4	SCHEMATIC: 									

Terminal numbers are on the switch.

Most of the above models are UL Recognized or CSA Certified; see details in the Supplement.

GENERAL SPECIFICATIONS

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	15,000 operations minimum for S331 & S331F/R/RN 25,000 operations minimum for all others
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F)
Angle of Throw: *a*	25° for S331s, 332s, 335s, 338s, and 339s 30° for S333s 32° for 300s

ADDITIONAL RATING

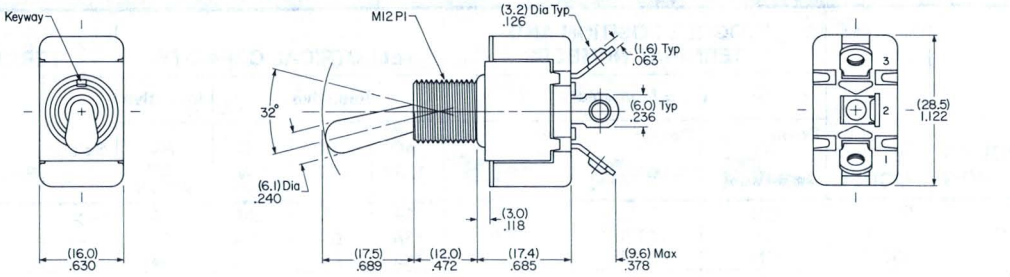
When S332 models are used at 25A @ 250V AC, the electrical life drops to 15,000 operations minimum.

SERIES S TOGGLE SWITCHES

HIGH RATED/STANDARD SIZE/1 & 2 POLE

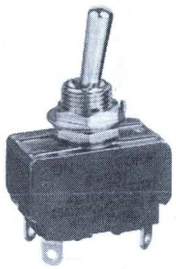
Dimensions for S301 ~ S309

S301 Model Shown

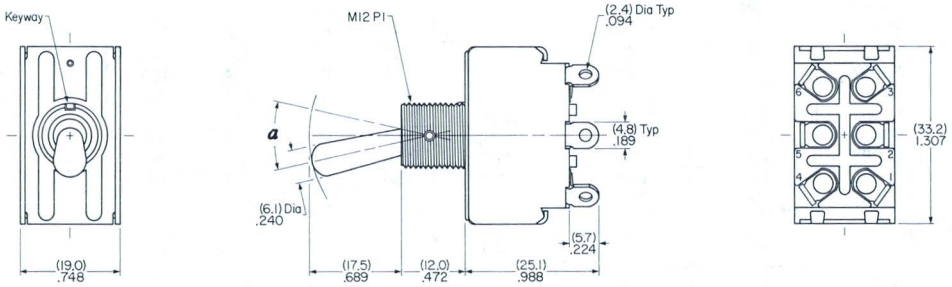


S301 models do not have terminal 2.

Dimensions for S331 ~ S339



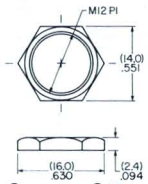
S331 Model Shown



S331 models do not have terminals 2 & 5.

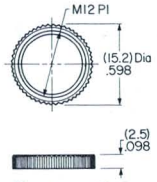
STANDARD HARDWARE

AT503 Hex Face Nut
Chrome/Brass



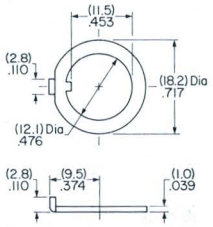
See page S16.

AT504M Knurled Face Nut
Chrome /Brass

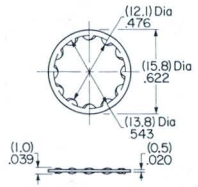


See page S16.

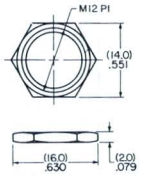
AT506 Locking Ring
Steel with Chromate/Zinc



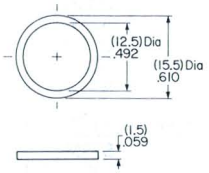
AT508 Internal Tooth Lockwasher
Steel with Chromate/Zinc



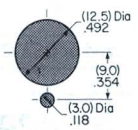
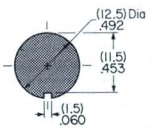
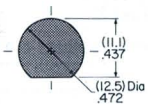
AT527M Hex Backup Nut
Nickel/Brass



AT537 O-ring for Splashproof Models
Nitrile Butadiene Rubber



MAXIMUM EFFECTIVE PANEL THICKNESS & CUTOUTS

	With Standard Hardware	Without Locking Ring	Without Locking Ring & Bottom Hex Nut	With 1 Hex Nut & O-ring for Splashproof
				
Model Numbers: S1A ~ 7F, 114, 116, 1000s S211s	3.0mm/.118" 2.9mm/.114"	4.0mm/.158" 3.9mm/.154"	4.0mm/.158" 3.9mm/.154"	4.0mm/.158"
S30s, 40s S300s, 330s, 400s	4.6mm/.181" 4.7mm/.185"	5.6mm/.220" 5.7mm/.224"	5.6mm/.220" 5.7mm/.224"	
S800s S4012, 530s	4.5mm/.177" 2.5mm/.098"	5.5mm/.217" 3.5mm/.138"	5.5mm/.217" 3.5mm/.138"	
S732 S520s Locking Lever Models	2.0mm/.079" 2.3mm/.091" 6.5mm/.256"	3.0mm/.118" 3.3mm/.130" 7.5mm/.295"	3.0mm/.118" 3.3mm/.130" 7.5mm/.295"	

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NKK SERIES S TOGGLE SWITCHES

MEDIUM & HIGH RATED/STANDARD SIZE/3 & 4 POLE

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS ( ) = Momentary: Down (Keyway)	Center	Up	ELECTRICAL CAPACITY: Resistive AC 125V	Resistive AC 250V	Resistive DC 30V	Inductive AC 125V PF 0.6	TERMINALS: Solder Lug	Screw	Quick Connect	TOGGLES: Bat	Plastic Paddle	Fluo-res-cent Tip Paddle
3PST	S31	ON	NONE	OFF	25A	9A	20A	10A	X		---	X		
	S31F	ON	NONE	OFF	25A	9A	20A	10A	---		X	X		
CONNECTED TERMINALS		1-3 4-6 7-9	OPEN	OPEN	SCHEMATIC:									
3PDT	S32	ON	NONE	ON	25A	9A	20A	10A	X		---	X		
	S32F	ON	NONE	ON	25A	9A	20A	10A	---		X	X		
	S33	ON	OFF	ON	25A	9A	20A	10A	X	---	---	X		
	S33F	ON	OFF	ON	25A	9A	20A	10A	---	---	X	X		
	S33T	ON	OFF	ON	25A	9A	20A	10A	---	X	---	X		
	S35	ON	NONE	(ON)	15A	6A	20A	8A	X			X		
	S35B	ON	NONE	(ON)	5A	3A	---	---	X			X		
	S38	(ON)	OFF	(ON)	15A	6A	15A	8A	X			X		
	S39	ON	OFF	(ON)	15A	6A	15A	8A	X			X		
CONNECTED TERMINALS		2-3 5-6 8-9	OPEN	2-1 5-4 8-7	SCHEMATIC:									
4PST	S41	ON	NONE	OFF	25A	9A	20A	10A	X	---	---	X	---	---
	S41F	ON	NONE	OFF	25A	9A	20A	10A	---	---	X	X	---	---
	S41R	ON	NONE	OFF	25A	9A	20A	10A	X	---	---	---	X	---
	S41RN	ON	NONE	OFF	25A	9A	20A	10A	X	---	---	---	---	X
	S41T	ON	NONE	OFF	25A	9A	20A	10A	---	X	---	X	---	---
CONNECTED TERMINALS		1-3 4-6 7-9 10-12	OPEN	OPEN	SCHEMATIC:									
4PDT	S42	ON	NONE	ON	25A	9A	20A	10A	X	---	---	X	---	---
	S42F	ON	NONE	ON	25A	9A	20A	10A	---	---	X	X	---	---
	S42R	ON	NONE	ON	25A	9A	20A	10A	X	---	---	---	X	---
	S42RN	ON	NONE	ON	25A	9A	20A	10A	X	---	---	---	---	X
	S42T	ON	NONE	ON	25A	9A	20A	10A	---	X	---	X	---	---
	S43	ON	OFF	ON	25A	9A	20A	10A	X		---	X	---	---
	S43F	ON	OFF	ON	25A	9A	20A	10A	---		X	X	---	---
	S43R	ON	OFF	ON	25A	9A	20A	10A	X		---	---	X	---
	S43RN	ON	OFF	ON	25A	9A	20A	10A	X		---	---	---	X
	S45	ON	NONE	(ON)	15A	6A	20A	8A	X			X		
	S48	(ON)	OFF	(ON)	15A	6A	20A	8A	X			X	---	---
	S48R	(ON)	OFF	(ON)	15A	6A	20A	8A	X			---	X	---
	S48RN	(ON)	OFF	(ON)	15A	6A	20A	8A	X			---	---	X
	S49	ON	OFF	(ON)	15A	6A	20A	8A	X			X	---	---
	S49R	ON	OFF	(ON)	15A	6A	20A	8A	X			---	X	---
	S49RN	ON	OFF	(ON)	15A	6A	20A	8A	X			---	---	X
CONNECTED TERMINALS		2-3 5-6 8-9 11-12	OPEN	2-1 5-4 8-7 11-10	SCHEMATIC:									

Terminal numbers are on the switch. UL Recognized: most S30s & S40s. CSA Certified: S30s, S41, S42, S43; see details in the Supplement.

GENERAL SPECIFICATIONS

Contact Resistance: 10 milliohms maximum

Insulation Resistance: 1,000 megohms minimum @ 500V DC

Dielectric Strength: 2,000V AC minimum

Mechanical Life: 50,000 operations minimum

Electrical Life: 15,000 operations minimum for S31B, 32B, 33B, S41B, S42B, & S43B
25,000 operations minimum for all others

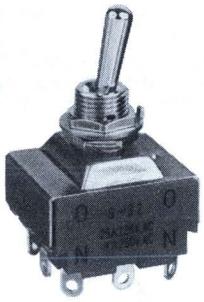
Ambient Temp Range: -10°C through +70°C (+14 °F through +158°F)

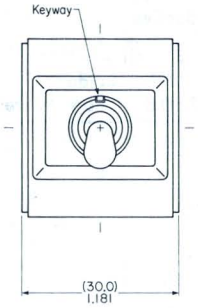
Angle of Throw: *a* 30° for S33s & S43s
25° for all others

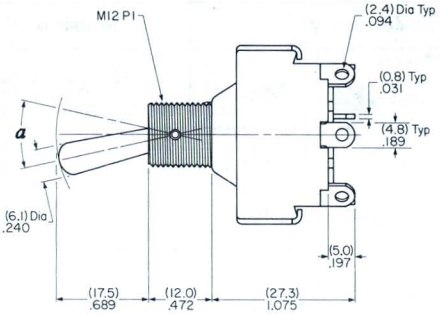
NKK SERIES S TOGGLE SWITCHES

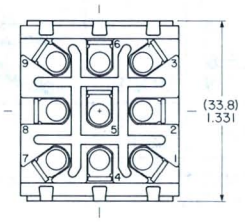
MEDIUM & HIGH RATED/STANDARD SIZE/3 & 4 POLE

Dimensions for S31 ~ S39





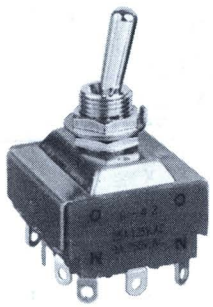


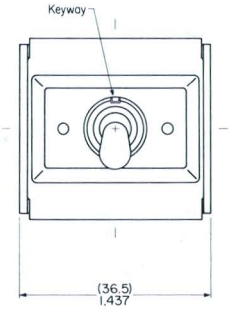


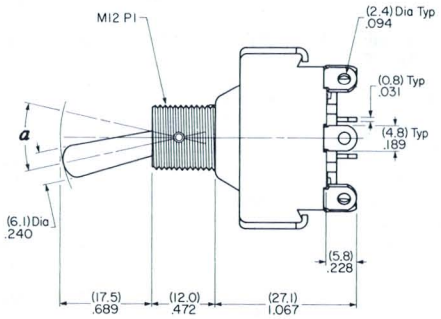
S32 Model Shown

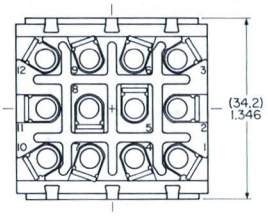
S31 models do not have terminals 2, 5, & 8.

Dimensions for S41 ~ S49RN







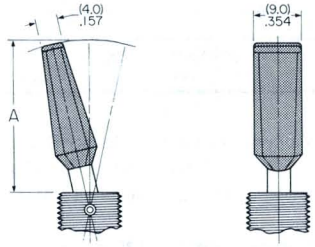


S42 Model Shown

S41 models do not have terminals 2, 5, 8, & 11.

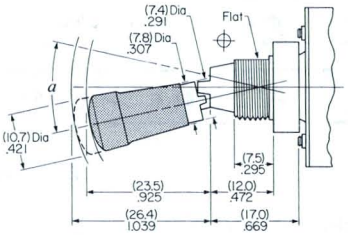
R **Flatted Lever**

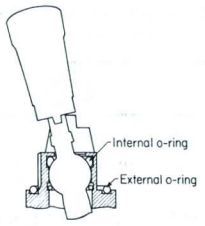
RN **Flatted Fluorescent Tip Lever**



Material: ABS Resin Color: Black Only
Dimension A: S100s 29.0mm (1.142")
S40s and S330s 27.0mm (1.063")

L **Locking Lever with Panel Seal**





Models S1AL, S2AL, S3AL, S6AL, S7AL, and S21AL have the locking lever plus panel seal.
It is supplied with an alumite finished aluminum cap, hex nut AT503, lockwasher AT508, and o-ring AT537.
These models have the same body dimensions as the splashproof models on page S10.

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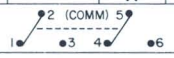
NKK SERIES S TOGGLE SWITCHES

MOTOR LOAD/STANDARD SIZE/2 POLE/BUSHING MOUNT

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS ( ) = Momentary: Down (Keyway)	Center	Up	ELECTRICAL CAPACITY: Resistive AC 125V	Resistive AC 250V	Inductive PF 0.75-0.8 AC 125V	Inductive PF 0.75-0.8 AC 250V	Motor Load AC 125V	TERMINALS: Solder Lug	Screw	Quick Connect	TOGGLES: Bat	Plastic Paddle	Fluorescent Tip Paddle
DPST	S421	ON	NONE	OFF	25A	25A	25A	25A	750W	X	---		X		
	S421T	ON	NONE	OFF	20A	20A	20A	20A	750W	---	X		X		
CONNECTED TERMINALS		1-3 4-6	OPEN	OPEN	SCHEMATIC:										
DPDT	S422	ON	NONE	ON	25A	25A	25A	25A	750W	X	---		X		
	S422T	ON	NONE	ON	20A	20A	20A	20A	750W	---	X		X		
	S423	ON	OFF	ON	25A	25A	25A	25A	750W	X	---		X		
	S423T	ON	OFF	ON	20A	20A	20A	20A	750W	---	X		X		
	S425	ON	NONE	(ON)	15A	15A	15A	15A	400W	X	---		X		
	S425T	ON	NONE	(ON)	15A	15A	15A	15A	400W	---	X		X		
	S428	(ON)	OFF	(ON)	15A	15A	15A	15A	400W	X	---		X		
	S428T	(ON)	OFF	(ON)	15A	15A	15A	15A	400W	---	X		X		
	S429	ON	OFF	(ON)	15A	15A	15A	15A	400W	X	---		X		
	S429T	ON	OFF	(ON)	15A	15A	15A	15A	400W	---	X		X		
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4	SCHEMATIC: 										

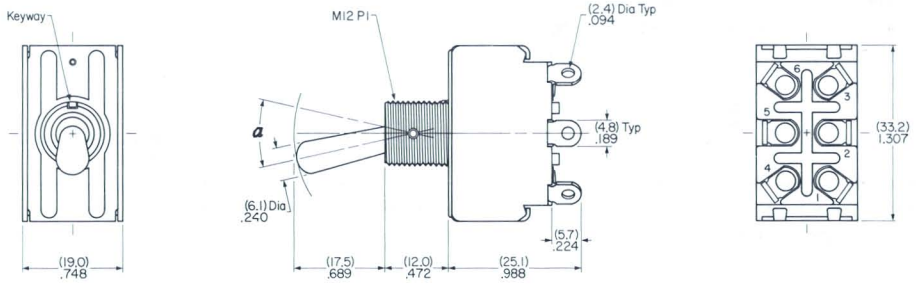
Terminal numbers are on the switch.

GENERAL SPECIFICATIONS

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	15,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F)
Angle of Throw:	28° for S423s 24° for all others

Dimensions for S421 ~ S429

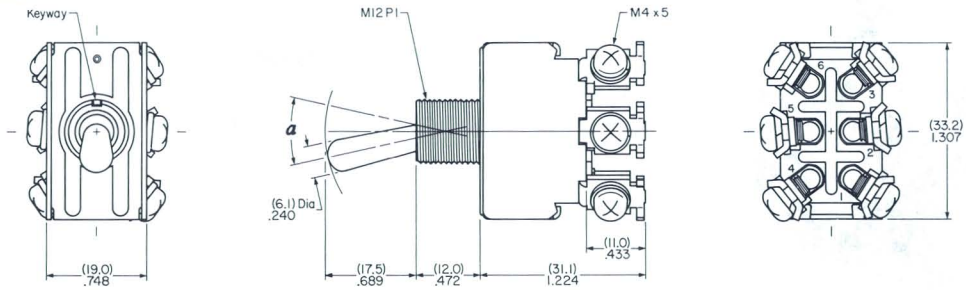
S422 Model Shown



S421 model does not have terminals 2 & 5.

Dimensions for S421T ~ S429T

S423T Model Shown

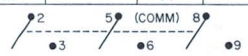
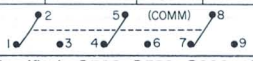


S421T model does not have terminals 2 & 5.

NKK SERIES S TOGGLE SWITCHES

HIGH CAPACITY/AC & DC/2 & 3 POLE/BUSHING MOUNT

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS: Down (Keyway)	Center	Up	ELECTRICAL CAPACITY: Resistive AC 125V	Resistive AC 250V	Resistive DC 30V	Inductive AC 125V PF 0.6	TERMINALS: Solder Lug	Screw	Quick Connect	TOGGLES: Bat	Plastic Paddle	Fluorescent Tip Paddle
DPST	S821	ON	NONE	OFF	30A	30A	---	---		X		X		
CONNECTED TERMINALS		2-3 5-6	OPEN	OPEN	SCHEMATIC:									
DPDT	S532	ON	NONE	ON	30A	15A	30A	15A		X		X		
	S533	ON	OFF	ON	30A	15A	30A	15A		X		X		
	S732	ON	NONE	ON	50A	30A	50A	25A		X		X		
	S822	ON	NONE	ON	30A	30A	---	---		X		X		
	S823	ON	OFF	ON	30A	30A	---	---		X		X		
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4	SCHEMATIC:									
3PST	S831	ON	NONE	OFF	30A	30A	---	---		X		X		
CONNECTED TERMINALS		2-3 5-6 8-9	OPEN	OPEN	SCHEMATIC: 									
3PDT	S522	ON	NONE	ON	30A	15A	30A	15A		X		X		
	S523	ON	OFF	ON	30A	15A	30A	15A		X		X		
	S832	ON	NONE	ON	30A	30A	---	---		X		X		
	S833	ON	OFF	ON	30A	30A	---	---		X		X		
CONNECTED TERMINALS		2-3 5-6 8-9	OPEN	2-1 5-4 8-7	SCHEMATIC: 									

Terminal numbers are on the switch. UL Recognized: S820s & S830s. CSA Certified: S532, S533, S820s, S830s.

GENERAL SPECIFICATIONS

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC for S522, S523, S732, and S800s 2,000 megohms minimum @ 500V DC for S532, S533
Dielectric Strength:	2,000V AC minimum for S500s & S800s 3,000V AC minimum for S732
Mechanical Life:	50,000 operations minimum
Electrical Life:	25,000 operations minimum
Ambient Temp Range:	- 10°C through +70°C (+14°F through +158°F)
Angle of Throw:	25° for S522 & S523 27° for S532 & S533 28° for S800s 32° for S732

MOUNTING NUTS FOR S SERIES

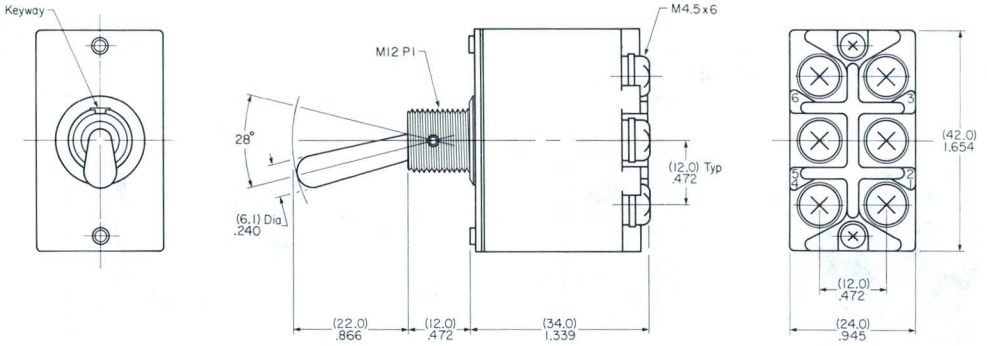
All S Series switches are supplied with the same backup nut; however, the face nuts differ as shown in the table below.

Series	Hex Nut AT503	Knurled Nut AT504M	Series	Hex Nut AT503	Knurled Nut AT504M
S1AW~29AW	X	---	S821~833	X	---
S1A~3B	---	X	S532~732	X	---
S21A~7B	---	X	S522~523	X	---
S114~211	---	X	S821D~833D	X	---
S31~39	X	---	S532D~533D	X	---
S41~49	X	---	S41R~339RN	---	X
S301~309T	X	---	S1F~333F	X	---
S331~339T	X	---	S1001~4012	---	X
S421~429T	X	---			

The minor difference in hardware thickness does not change the allowable panel thickness shown on page S14.

Dimensions for S821 ~ S823

S821 Model Shown



S821 model does not have terminals 1 & 4.

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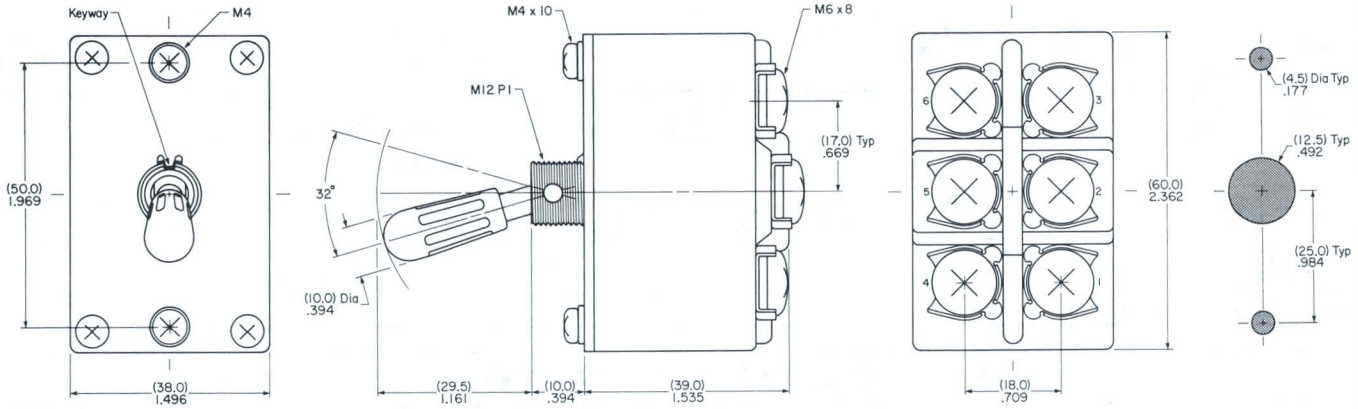
NKK SERIES S TOGGLE SWITCHES

HIGH CAPACITY/AC & DC/2 & 3 POLE/BUSHING MOUNT

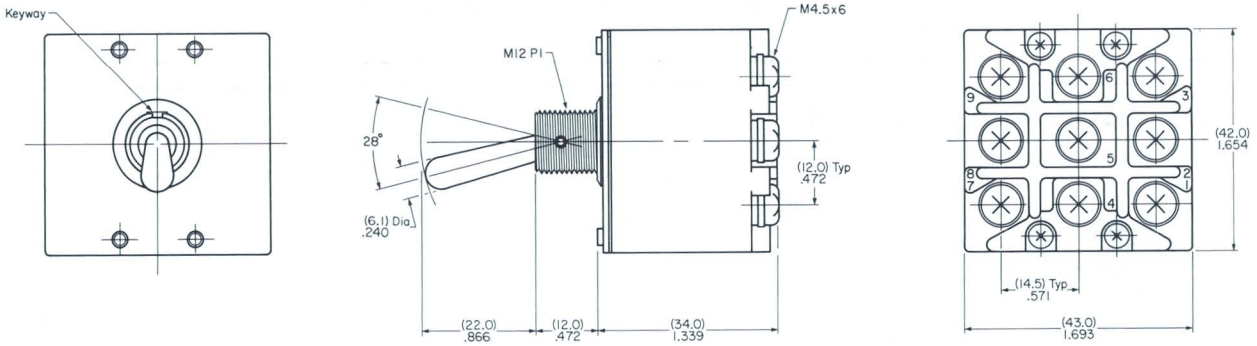
Dimensions for S532 & S533 are given on the following page.

Dimensions for S732



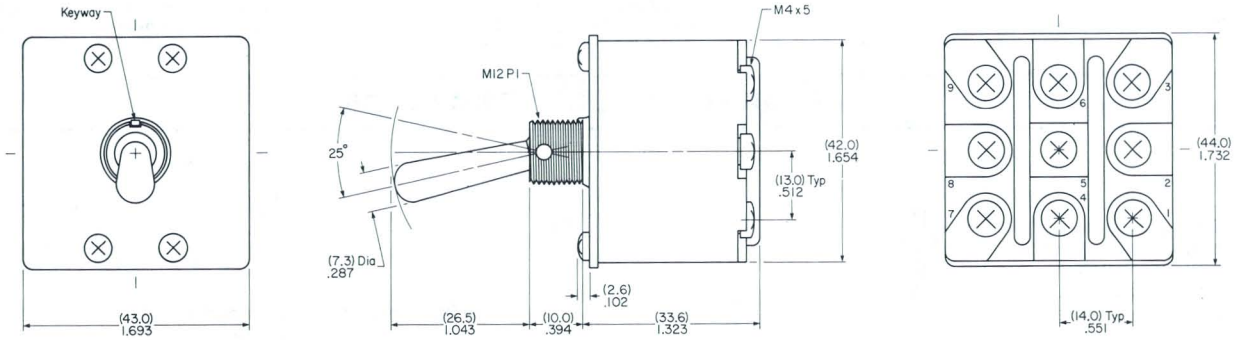
The cap of phenolic resin is black.

Dimensions for S831 ~ S833



S831 model does not have terminals 1, 4, & 7.

Dimensions for S522 ~ S523



NKK SERIES S TOGGLE SWITCHES

HIGH CAPACITY/AC & DC/2 POLE/BUSHING MOUNT

POLES, CIRCUITS, & RATINGS

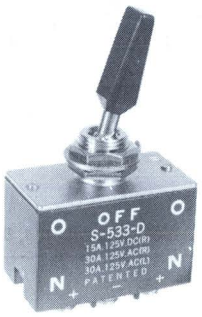
POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS: Down (Keyway)	Center	Up	ELECTRICAL CAPACITY: Resistive Load: AC 24V	AC 48V	AC 125V	AC 250V	DC 24V	DC 48V	DC 125V	DC 250V	TERMINALS TOGGLES: Screw	Plastic Paddle
DPDT	S532D	ON	NONE	ON	30A	30A	30A	15A	30A	30A	15A	7.5A	X	X
	S533D	ON	OFF	ON	30A	30A	30A	15A	30A	30A	15A	7.5A	X	X
					Inductive Load									
DPDT	S532D	ON	NONE	ON	30A	30A	30A	15A	15A	10A	6A	3A	X	X
	S533D	ON	OFF	ON	30A	30A	30A	15A	15A	10A	5A	3A	X	X
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4	SCHEMATIC:									

Terminal numbers are on the switch.

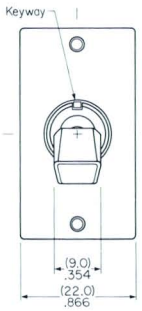
GENERAL SPECIFICATIONS

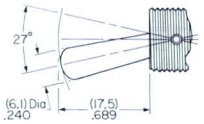
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	500 megohms minimum @ 500V DC
Dielectric Strength:	2000V AC minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F)
Angle of Throw:	27°

Dimensions for S532, S532D, S533, & S533D

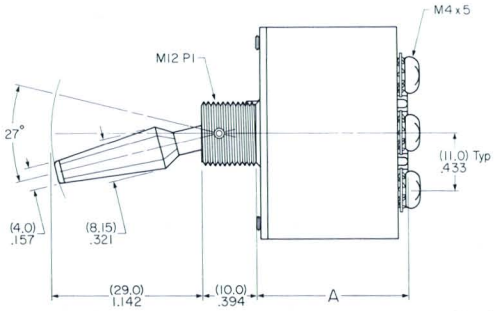


S533D Model Shown

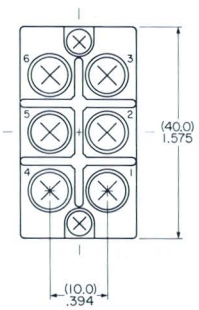




Toggle for S532 & S533



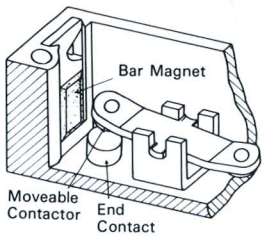
Dimension "A":
1.122mm (28.5") for S532 & S533
1.130mm (28.7") for S532D & S533D

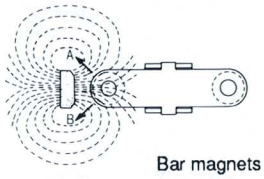


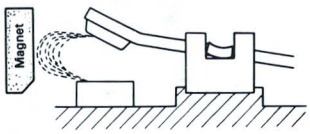
Positive (+) must be connected to end terminals & negative (-) to common terminals.

DESIGN FOR INDUCTIVE DC LOADS

The high capacity switches are designed to protect contacts by extinguishing the arc which occurs at break.







Bar magnets are placed at each end of the switch and their magnetic field opposes the field created by the arcing current thereby extinguishing the arc.

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NKK SERIES S TOGGLE SWITCHES

HIGH CAPACITY/DC/2 & 3 POLE/BUSHING MOUNT

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS: Down (Keyway)	Center	Up	ELECTRICAL CAPACITY: Resistive DC 30V	Resistive DC 125V	TERMINALS: Solder Lug	Screw	Quick Connect	TOGGLES: Bat	Plastic Paddle	Fluo-res-cent Tip Paddle
DPST	S821D	ON	NONE	OFF	30A	15A		X			X	
CONNECTED TERMINALS		2-3 5-6	OPEN	OPEN	SCHEMATIC: 2 (COMM) 5, 3, 6							
DPDT	S822D	ON	NONE	ON	30A	15A		X			X	
	S823D	ON	OFF	ON	30A	15A		X			X	
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4	SCHEMATIC: 2 (COMM) 5, 1, 3, 4, 6							
3PST	S831D	ON	NONE	OFF	30A	15A		X			X	
CONNECTED TERMINALS		2-3 5-6 8-9	OPEN	OPEN	SCHEMATIC: 2, 5 (COMM) 8, 3, 6, 9							
3PDT	S832D	ON	NONE	ON	30A	15A		X			X	
	S833D	ON	OFF	ON	30A	15A		X			X	
CONNECTED TERMINALS		2-3 5-6 8-9	NONE	2-1 5-4 8-7	SCHEMATIC: 2, 5 (COMM) 8, 1, 3, 4, 6, 7, 9							

Terminal numbers are on the switch.

All the above models are UL Recognized and CSA Certified.

GENERAL SPECIFICATIONS

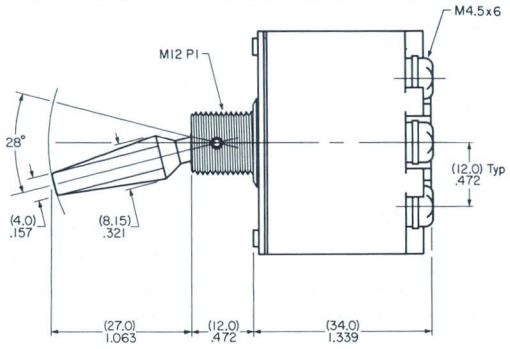
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F)
Angle of Throw:	28°

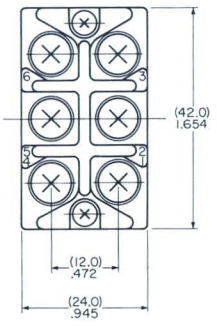
DESIGN FOR HIGH CAPACITY

The high capacity switches are designed to protect contacts by extinguishing the arc which occurs at break. Bar magnets are placed at each end of the switch and their magnetic field opposes the field created by the arcing current thereby extinguishing the arc.

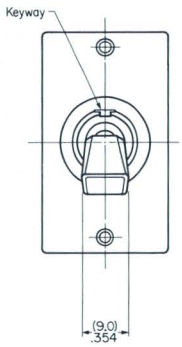
Dimensions for S821D ~ S833D

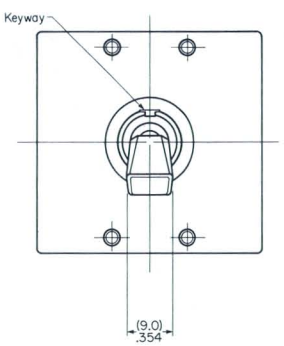
S832D Model Shown

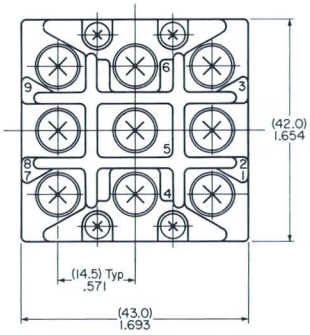




S821D model does not have terminals 1 & 4.







S831D model does not have terminals 1, 4, & 7.

SERIES S ROCKER SWITCHES

STANDARD SIZE/1 & 2 POLE/SUBPANEL MOUNT

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS ( ) = Momentary — Down	Center	Up	ELECTRICAL CAPACITY — Resistive AC 125V	AC 250V	DC 30V	Inductive AC 125V PF 0.6	SCHEMATICS
SPST	SW3211	ON	NONE	OFF	3A	1.5A	1.5A	1.5A	
CONNECTED TERMINALS		1-2	OPEN	OPEN					
SPST	SW3001A	ON	NONE	OFF	15A	6A	15A	10A	
CONNECTED TERMINALS		1-3	OPEN	OPEN					
SPDT	SW3002A	ON	NONE	ON	15A	6A	15A	10A	
	SW3003A	ON	OFF	ON	15A	6A	15A	10A	
	SW3012	ON	NONE	ON	6A	----	4A	----	
CONNECTED TERMINALS		2-3	OPEN	2-1					
DPDT	SW3006A	ON	NONE	ON	20A	10A	20A	10A	
	SW3007A	ON	OFF	ON	15A	6A	15A	10A	
	SW3008A	(ON)	OFF	(ON)	15A	6A	15A	10A	
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4					
DPDT	SW3116	ON	NONE	ON	5A	2A	5A	3A	
CONNECTED TERMINALS		2-1 5-4	OPEN	2-3 5-6					

Terminal numbers are on the switch.

GENERAL SPECIFICATIONS

Contact Resistance: 10 milliohms maximum

Insulation Resistance: 200 megohms min. @ 500V DC for SW3211, SW3012, and SW3116
1,000 megohms min. @ 500V DC for all others

Dielectric Strength: 1,000V AC minimum for SW3012
1,500V AC minimum for SW3211 and SW3116
2,000V AC minimum for all others

Mechanical Life: 30,000 operations minimum

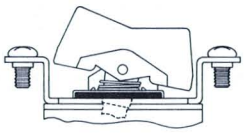
Electrical Life: 10,000 operations minimum

Ambient Temp Range: -10°C through +70°C (+14°F through +158°F)

Angle of Throw: *a* 24° for SW3001, SW3002, SW3006 & SW3008
28° for SW3003 & SW3007
Others shown on the dimension drawings

DUST COVERS

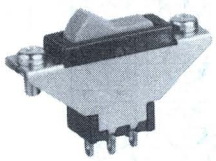
A silicone rubber seal beneath the rocker surrounds the actuator stem and prevents entry of contaminants thus protecting the contacts. Dust covers supplied on:
SW3006 SW3007 SW3008
May be ordered on other models by noting after the part number.

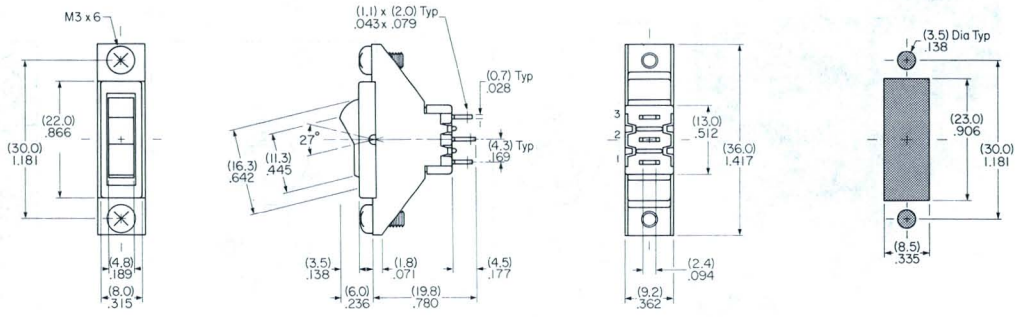


UL & CSA

UL Recognized	CSA Certified
SW3001 ~ 3006 w/suffix A	SW3001 ~ 3006 with suffix A, SW3007A, SW3116, & SW3211

Dimensions for SW3012





SW3012 Model Shown

Supplied with Gray Rocker & Black Bezel

Maximum Effective Panel Thickness: 2.5mm (.098")

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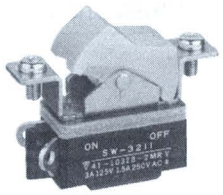
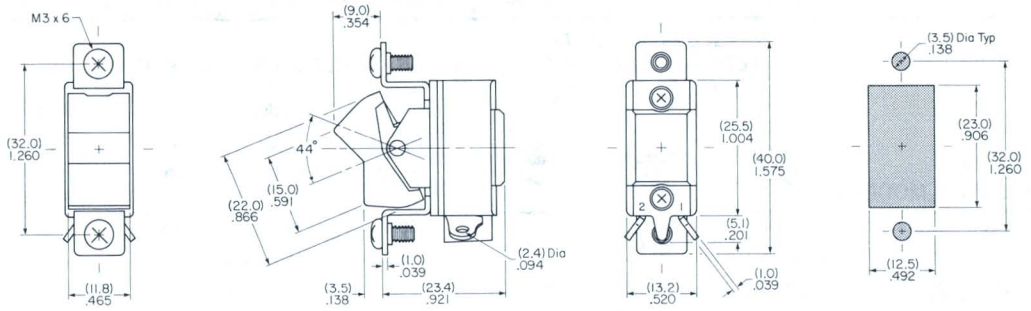
NKK SERIES S ROCKER SWITCHES

STANDARD SIZE/1 & 2 POLE/SUBPANEL MOUNT

Dimensions for SW3211



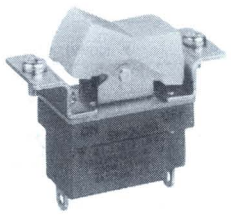


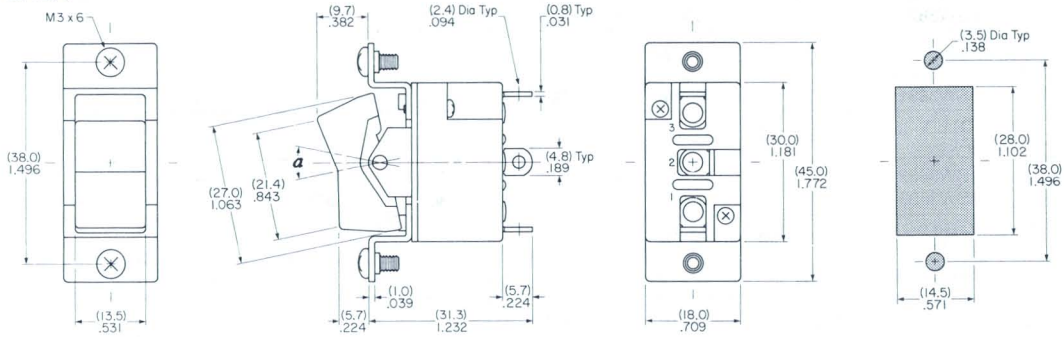
SW3211 Model Shown

Supplied with White Rocker Cap

Maximum Effective Panel Thickness: 3.0mm (.118")

Dimensions for SW3001A ~ 3003A



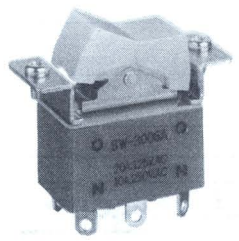


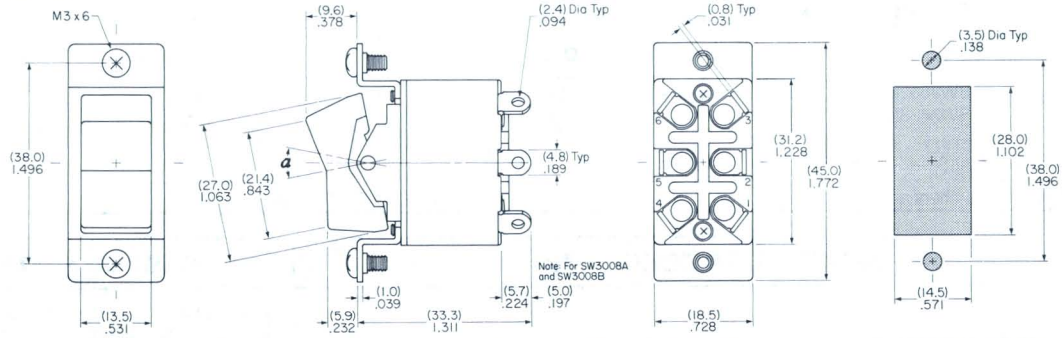
SW3001A Model Shown

Supplied with White Rocker Cap

Maximum Effective Panel Thickness: 5.0mm (.197") for SW3001 & SW3002 Models; 4.5mm (.177") for SW3003 Models.

Dimensions for SW3006A ~ 3008A



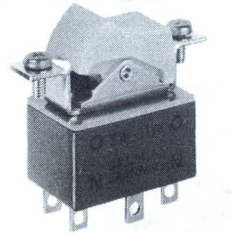


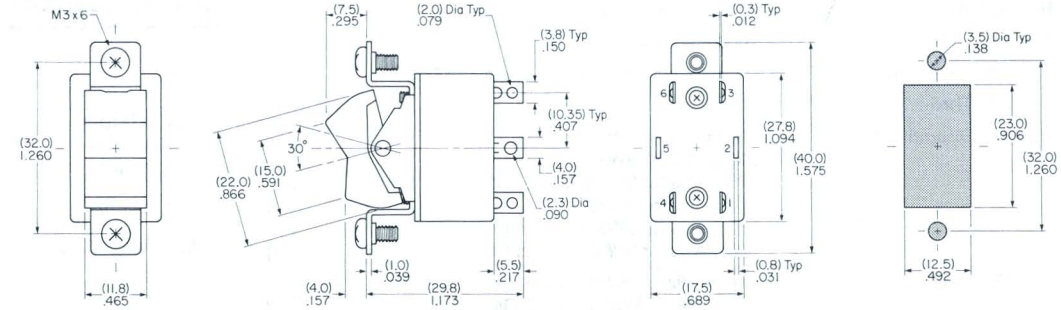
SW3006A Model Shown

Supplied with White Rocker Cap

Maximum Effective Panel Thickness: 5.0mm (.197") for SW3006 & SW3008 Models; 4.5mm (.177") for SW3007 Models .

Dimensions for SW3116





SW3116 Model Shown

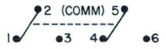
Supplied with White Rocker Cap

Maximum Effective Panel Thickness: 3.0mm (.118")

NKK SERIES S ROCKER SWITCHES

HIGH CAPACITY/2 & 3 POLE/SUBPANEL MOUNT

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	TOGGLE POSITION AND TERMINAL NUMBERS: Down	Center	Up	ELECTRICAL CAPACITY: Resistive AC 125V	Resistive AC 250V	Resistive DC 30V	Inductive AC 125V PF 0.6	SCHEMATICS
DPDT	SW3532	ON	NONE	ON	30A	15A	30A	15A	
	SW3533	ON	OFF	ON	30A	15A	30A	15A	
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4					
DPST	SW3821	ON	NONE	OFF	30A	30A	----	----	
CONNECTED TERMINALS		2-3 5-6	OPEN	OPEN					
DPDT	SW3822	ON	NONE	ON	30A	30A	----	----	
	SW3823	ON	OFF	ON	30A	30A	----	----	
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4					
3PST	SW3831	ON	NONE	OFF	30A	30A	----	----	
CONNECTED TERMINALS		2-3 5-6 8-9	OPEN	OPEN					
3PDT	SW3832	ON	NONE	ON	30A	30A	----	----	
	SW3833	ON	OFF	ON	30A	30A	----	----	
CONNECTED TERMINALS		2-3 5-6 8-9	OPEN	2-1 5-4 8-7					
DPST	SW3821D	ON	NONE	OFF	15A*		30A	----	
CONNECTED TERMINALS		2-3 5-6	OPEN	OPEN					
DPDT	SW3822D	ON	NONE	ON	15A*		30A	----	
	SW3823D	ON	OFF	ON	15A*		30A	----	
CONNECTED TERMINALS		2-3 5-6	OPEN	2-1 5-4					
3PST	SW3831D	ON	NONE	OFF	15A*		30A	----	
CONNECTED TERMINALS		2-3 5-6 8-9	OPEN	OPEN					
3PDT	SW3832D	ON	NONE	ON	15A*		30A	----	
	SW3833D	ON	OFF	ON	15A*		30A	----	
CONNECTED TERMINALS		2-3 5-6 8-9	OPEN	2-1 5-4 8-7					

Terminal numbers are on the switch.

* 15A @ 125V DC Resistive

GENERAL SPECIFICATIONS

Contact Resistance: 10 milliohms maximum

Insulation Resistance: 1,000 megohms min. @ 500V DC for SW3800s
2,000 megohms minimum @ 500V DC for SW3500s

Dielectric Strength: 2,000V AC minimum

Mechanical Life: 50,000 operations minimum

Electrical Life: 25,000 operations minimum

Ambient Temp Range: -10°C through +70°C (+14°F through +158°F)

Angle of Throw: 26°

Nominal Operating Force: 2,100 grams for SW3532
2,000 grams for SW3533 Off to On
675 grams for SW3533 On to Off
2,450 grams for SW3822
2,600 grams for SW3823 Off to On
1,000 grams for SW3823 On to Off

UL, CSA, & JETL: UL Recognized: SW3820s-3820Ds, SW3830s-3830Ds
CSA Certified: SW3820s-3820Ds, SW3830s-3830Ds
JETL for SW3821 at 30A rating plus 750W @ 125V AC.

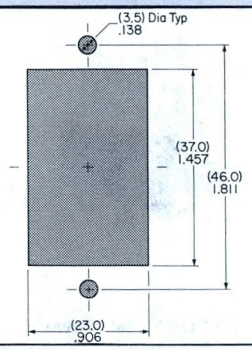
DESIGN FOR HIGH CAPACITY

The high capacity switches are designed to protect contacts by extinguishing the arc which occurs at break. Bar magnets are placed at each end of the switch & their magnetic field opposes the field created by the arcing current thus extinguishing the arc.

PANEL THICKNESS & CUTOUT

Maximum Effective Panel Thickness:

4.5mm (.177")



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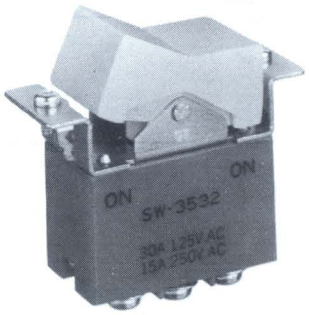
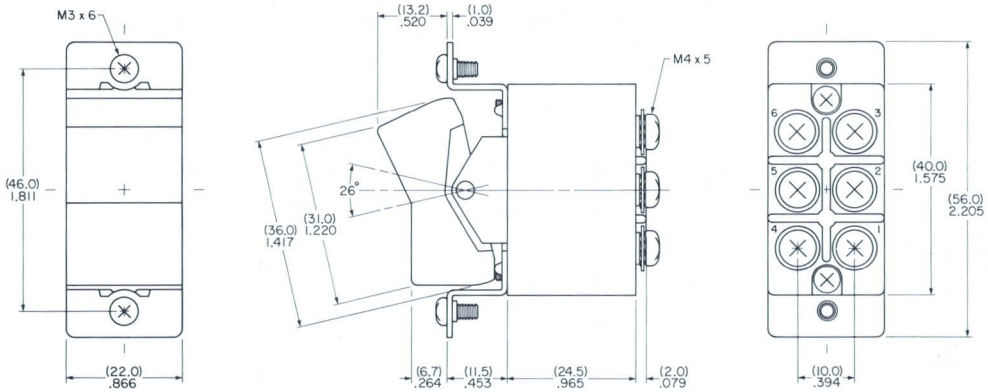
NKK SERIES S ROCKER SWITCHES

HIGH CAPACITY/2 & 3 POLE/SUBPANEL MOUNT

Dimensions for SW3532 ~ SW3533



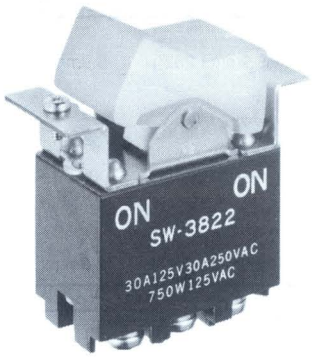


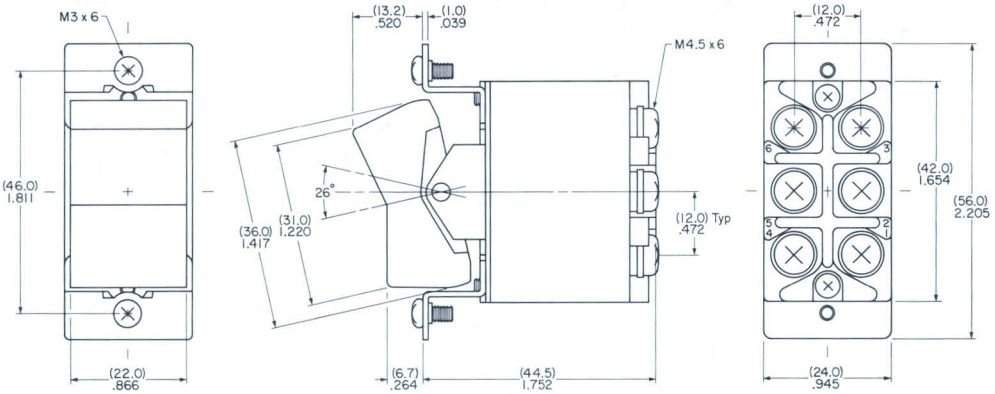
SW3532 Model Shown

Supplied with White Rocker Cap

Maximum Effective Panel Thickness: 3.0mm (.118")

Dimensions for SW3821 ~ SW3823 & SW3821D ~ SW3823D



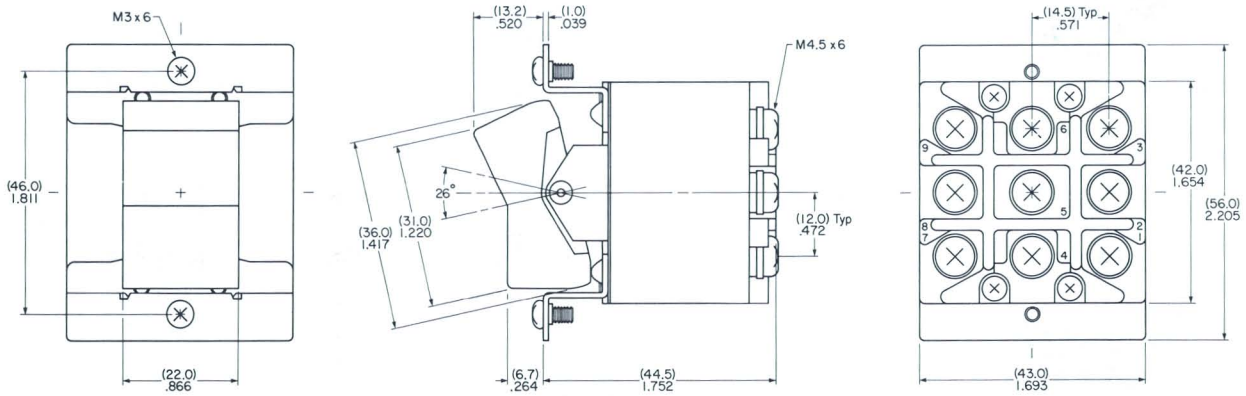


SW3822 Model Shown

Supplied with White Rocker Cap
SW3821 & 3821D do not have terminals 1 & 4.

Max. Effective Panel Thickness: 5.0mm (.197") for SW3001 & 3002 Models; 4.5mm (.177") for SW3003 Models.

Dimensions for SW3831 ~ SW3833 & SW3831D ~ SW3833D



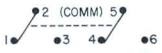
Supplied with White Rocker Cap
SW3831 does not have terminals 1, 4 & 7.

Maximum Effective Panel Thickness: 3.0mm (.118")

NKK SERIES SB PUSHBUTTON SWITCHES

STANDARD SIZE/MOMENTARY/BUSHING MOUNT

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	PUSHBUTTON POSITION & TERMINAL NUMBERS ( ) = Momentary — Normal (Keyway)	Down	ELECTRICAL CAPACITY Resistive — AC 125V	AC 250V	TERMINALS — Solder Lug	Screw	SCHEMATICS
SPST	SB221NO	OFF	(ON)	3A	1.5A	X	----	
	SB221TNO	OFF	(ON)	3A	1.5A	----	X	
CONNECTED TERMINALS		OPEN	1-2					
SPST	SB221NC	ON	(OFF)	3A	1.5A	X	----	
	SB221TNC	ON	(OFF)	3A	1.5A	----	X	
CONNECTED TERMINALS		1-2	OPEN					
DPDT	SB61A	ON	(ON)	10A	5A	X	----	
	SB61B	ON	(ON)	3A	1.5A	X	----	
	SB63A*	ON	(ON)	10A	5A	X	----	
CONNECTED TERMINALS		2-3 5-6	2-1 5-4					

Terminal numbers are on the switch. CSA - all SB221s; UL - SB61A; JETL - all SB221s. *SB63A has lockdown.

GENERAL SPECIFICATIONS

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC for SB220s 1,000 megohms minimum @ 500V DC for SB60s
Dielectric Strength:	2,000V AC minimum between contacts 1,500V AC minimum between contacts & case
Mechanical Life:	50,000 operations minimum for SB220s 30,000 operations minimum for SB60s
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F)
Travel:	SB221s 2.95mm (.116") & SB60s 2.4mm (.094")

PANEL CUTOUT & THICKNESS

SB220 Models:

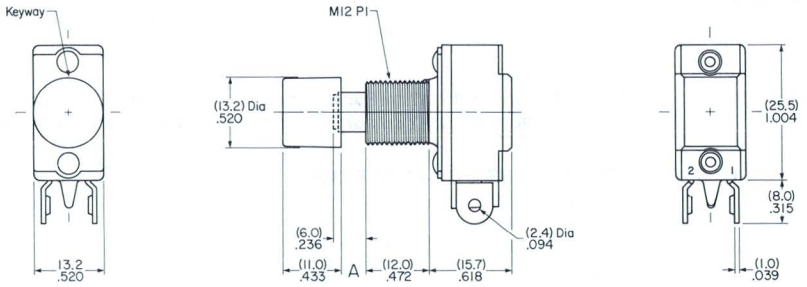
4.9mm (.193") 5.9mm (.232") 5.9mm (.232")

SB60 Models:

7.0mm (.276") 8.0mm (.315") 8.0mm (.315")

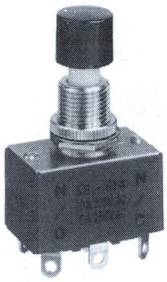
Dimensions for SB221 Models

SB221NO Model Shown w/AT414 Cap

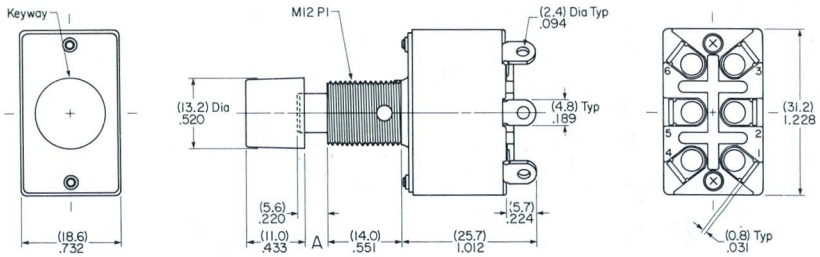


Dimension A: 4.7mm (.185") for NO models & 3.8mm (.150") for NC models.

Dimensions for SB60 Models



SB61A Model Shown w/AT414 Cap



Dimension A: 4.3mm (.169") for SB61 models & 3.3mm (.130") for SB63 models.
Lockdown for SB63A is achieved by actuating & then turning the button clockwise.

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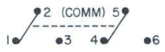
NKK SERIES SB PUSHBUTTON SWITCHES

STANDARD SIZE/ALTERNATE ACTION/BUSHING MOUNT

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	PUSHBUTTON POSITION & TERMINAL NUMBERS: Normal	Down	ELECTRICAL CAPACITY: Resistive AC 125V	Resistive AC 250V	TERMINALS: Solder Lug	Screw	SCHEMATICS
SPST	SB265	ON	OFF	6A	3A	X		
	SB265T	ON	OFF	6A	3A		X	
CONNECTED TERMINALS		1-2	OPEN					
DPDT	SB285	ON	ON	6A	3A	X	---	
	SB25	ON	ON	15A	9A	X	---	
	SB25B	ON	ON	5A	3A	X	---	
CONNECTED TERMINALS		2-3 5-6	2-1 5-4					

Terminal numbers are on the switch.

UL Recognized: SB25, SB265, SB285; CSA Certified SB25, SB265; UL & CSA details in the Supplement.

GENERAL SPECIFICATIONS

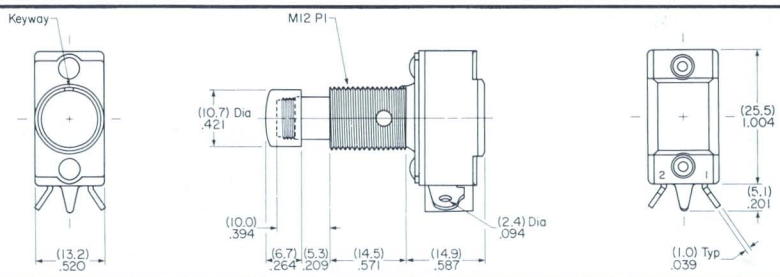
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	100 megohms minimum @ 500V DC for SB25 & SB25B 200 megohms minimum @ 500V DC for SB265 & SB285
Dielectric Strength:	1,500V AC minimum
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F)
Total Travel:	SB265 5.4mm (.213"); SB285 & SB25s 4.95mm (.195")

PANEL CUTOUT & THICKNESS

SB265	7.4mm (.291")	8.4mm (.331")	8.4mm (.331")
SB285	6.9mm (.272")	7.9mm (.311")	7.9mm (.311")
SB25	6.5mm (.256)	7.5mm (.295")	7.5mm (.295")

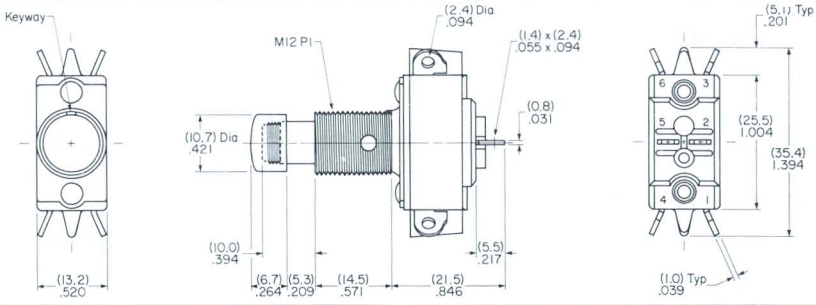
Dimensions for SB265 Model

SB265 Model Shown

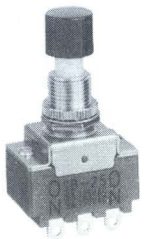


Dimensions for SB285 Model

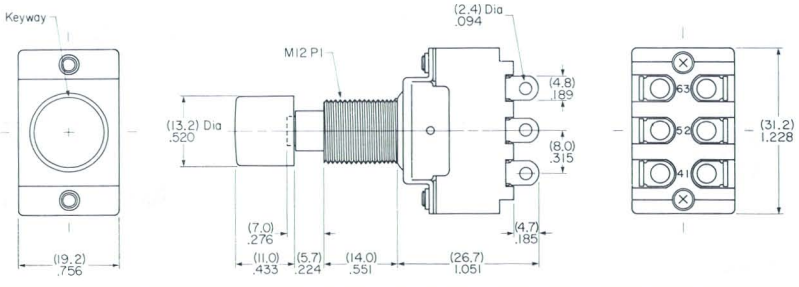
SB285 Model Shown



Dimensions for SB25 & SB25B Models



SB25 Model Shown



NKK SERIES SB PUSHBUTTON SWITCHES

STANDARD SIZE/PUSH-PULL/BUSHING MOUNT

POLES, CIRCUITS, & RATINGS

POLE & THROW	MODEL	PUSHBUTTON POSITION & TERMINAL NUMBERS: Normal	PUSHBUTTON POSITION & TERMINAL NUMBERS: Down	ELECTRICAL CAPACITY: Resistive AC 125V	ELECTRICAL CAPACITY: Resistive AC 250V	TERMINALS: Solder Lug	TERMINALS: Screw	SCHEMATICS
SPST	SB862	ON	OFF	10A	5A	X	----	
CONNECTED TERMINALS		1-2	OPEN					
DPDT	SB282	ON	ON	6A	3A	X	----	
CONNECTED TERMINALS		2-3 5-6	2-1 5-4					

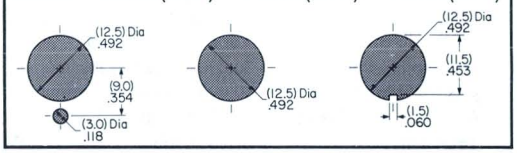
Terminal numbers are not on SB862 but are on SB282. Approvals: JETL - SB862.

GENERAL SPECIFICATIONS

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,500V AC minimum
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +70°C (+14°F through +158°F)
Travel:	SB862 4.5mm (.177") & SB282 1.5mm (.059")

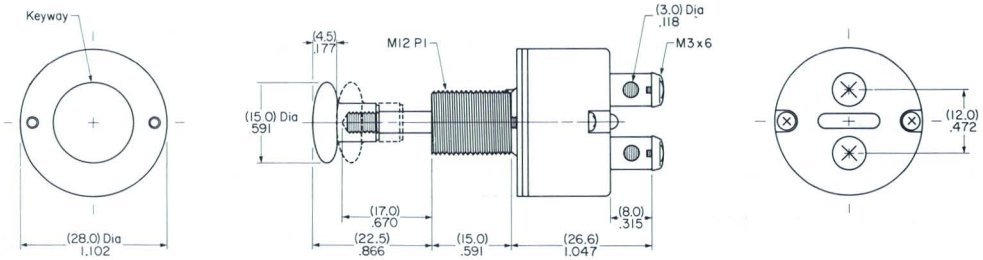
PANEL CUTOUT & THICKNESS

SB862 :	5.2mm (.205")	6.2mm (.244")	6.2mm (.244")
SB282:	6.9mm (.272")	7.9mm (.311")	7.9mm (.311")



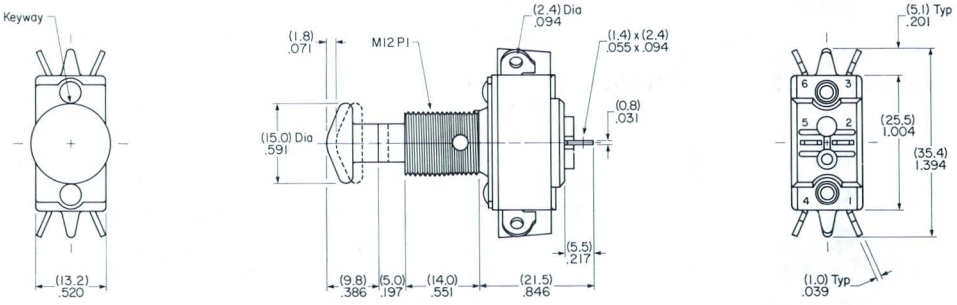
Dimensions for SB862 Model

SB862 Model Shown



Dimensions for SB282 Model

SB282 Model Shown



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SERIES SDB PUSHBUTTON SWITCHES

STANDARD SIZE/ON-ON/SUBPANEL, FLUSH & SNAP-IN

TYPICAL SWITCH ORDERING EXAMPLE

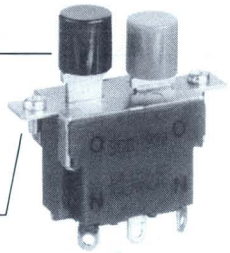
SDB222 **F** — **2** **AC**

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (SDB222F-2AC):

SERIES SDB PUSHBUTTON

Round Caps of Black & Red

Subpanel Mounting



MOUNTING	
S	Panel
F	Subpanel
M	Snap-in for square caps

CAPS	
1	Square
2	Round

CAP COLORS	
A	Black
B	White
C	Red
F	Green

GENERAL SPECIFICATIONS

Electrical Capacity:	
Resistive Load	15A @ 125V AC or 10A @ 250V AC or 10A @ 30V DC
Inductive Load	15A @ 125V AC PF = (0.6)
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,500V AC minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	25,000 operations minimum
Maximum Temperature:	-10°C through +70°C (+14°F through 158°F)
Total Travel:	3.6mm (.142")

POLES & CIRCUITS

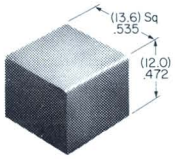
POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS: Normal	Down
DPDT	SDB222S	ON	ON
	SDB222F	ON	ON
	SDB222M	ON	ON
CONNECTED TERMINALS		2-3 5-6	2-1 5-4
SCHEMATIC			

Terminal numbers are on the switch. Plunger position shown with part number facing.

SNAP-ON CAPS

1

AT440
Square
Polycarbonate
Colors: A B C F



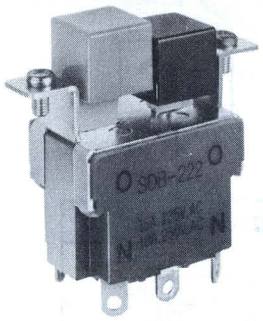
2

AT439
Round
Polycarbonate
Colors: A B C F

NKK SERIES SDB PUSHBUTTON SWITCHES

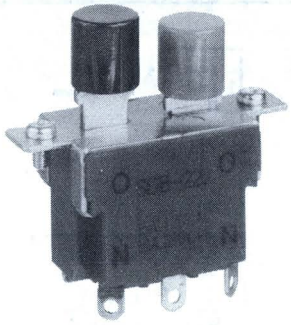
STANDARD SIZE/ON-ON/SUBPANEL, FLUSH & SNAP-IN

Panel Mounting



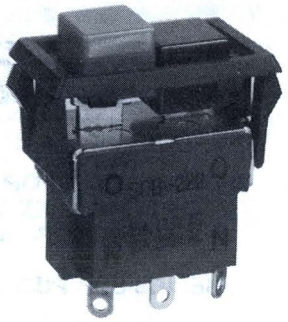
SDB222S Model Shown

Subpanel Mounting



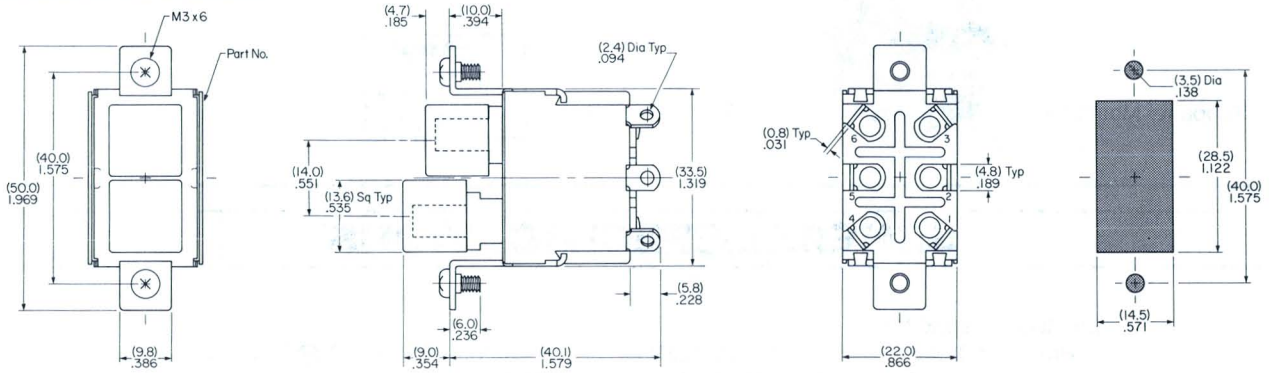
SDB222F Model Shown

Snap-in Mounting

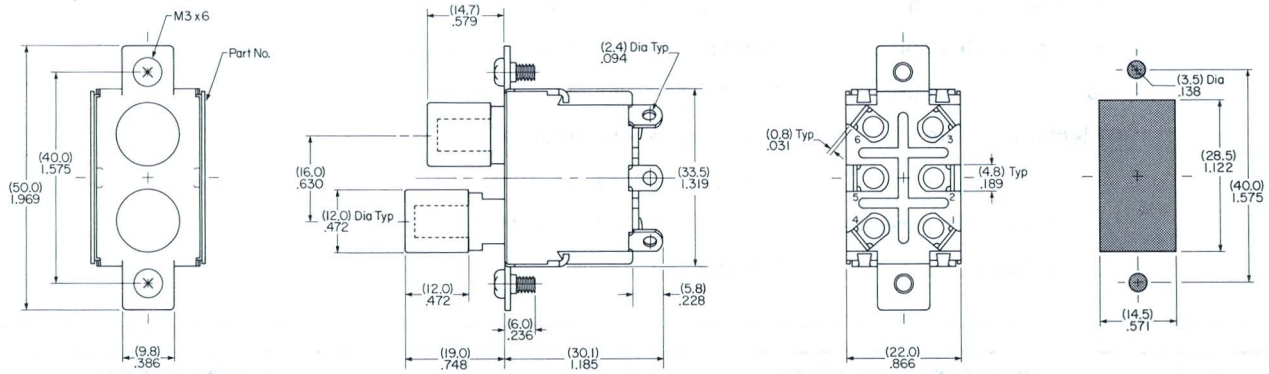


SDB222M Model Shown

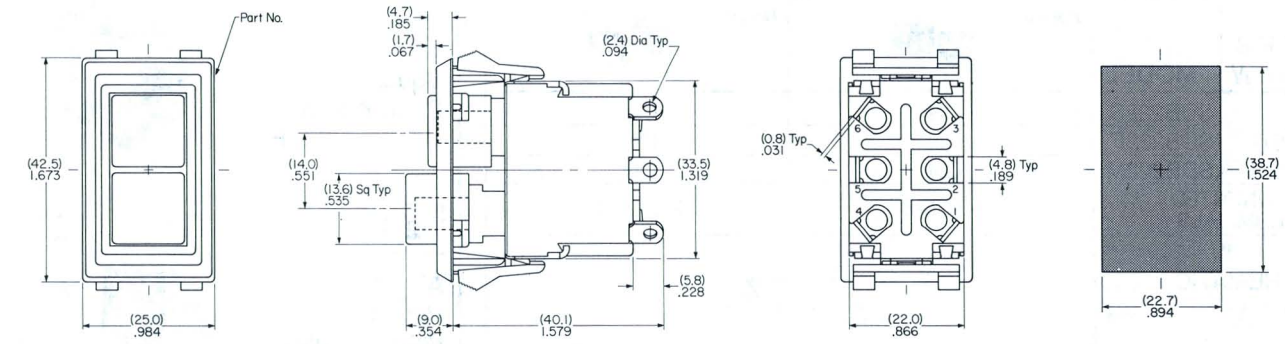
Dimensions for SDB222S



Dimensions for SDB222F



Dimensions for SDB222M



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SERIES SCB PUSHBUTTON SWITCHES

SNAP SWITCH/PUSHBUTTON SUPERSTRUCTURE

TYPICAL SWITCH ORDERING EXAMPLE

SCB 2 5 P 10 A – 4 CA

POLES	
1	SPDT
2	DPDT

CIRCUITS		
5	ON	(ON)
6	ON	ON

HOUSINGS	
P	Plastic (with momentary only)
S	Steel

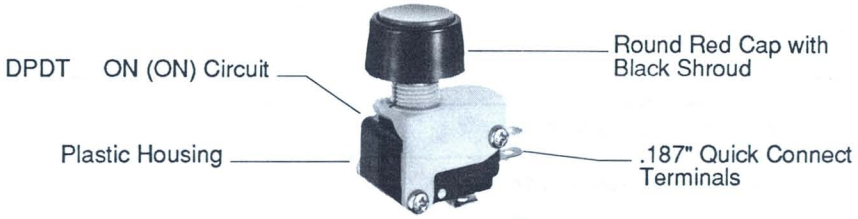
RATINGS	
10	Long Life 10A
15	High Capacity 15A

TERMINALS	
A	.187" Quick Connect
B	.250" Quick Connect
C	Screw
D	Solder Lug

CAPS & SHROUDS	
For Momentary	
1	.315" Diameter Cap
2	.394" Diameter Cap
3	.520" Diameter Cap
For Momentary & Alternate Action	
4	Round Cap & Shroud
5	Rectangular Cap & Shroud

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (SCB25P10A-4CA):

SERIES SCB PUSHBUTTON



Long Life 10 Amp Rating

COLORS		
Caps		Shrouds
A	Black	A
B	White	B
C	Red	---
D	Orange	---
E	Yellow	---
F	Green	---
G	Blue	---
H	Gray	H

See details next page.

GENERAL SPECIFICATIONS

Electrical Capacity:	
Resistive Load	10A & 1/3HP @ 125 or 250V AC for long life models 15A & 1/2HP @ 125 or 250V AC for high capacity models
Lamp Load	5A @ 125V AC
Contact Resistance:	15 milliohms maximum
Insulation Resistance:	100 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	5,000,000 operations minimum for long life models 1,000,000 operations minimum for high capacity models
Electrical Life:	25,000 operations minimum
Ambient Temperature:	-55°C (-67°F) ~ +82°C (+180°F)
Travel:	Pretravel .047" Overtravel .040" Differential Travel .011"
Operating Force:	8 ounces
UL & CSA:	Internal snap switch is UL Recognized & CSA Certified; superstructure is not.

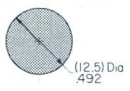
MOUNTING

Maximum Effective Panel Thickness & Cutout:

Plastic Momentary -
4.2mm (.165")
4.0mm (.157") w/shroud

Steel Momentary -
4.5mm (.177")
4.0mm (.157") w/shroud

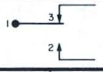
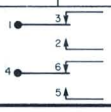
Steel Alternate Action -
9.5mm (.374")
9.0mm (.354") w/shroud



NKK SERIES SCB PUSHBUTTON SWITCHES

SNAP SWITCH/PUSHBUTTON SUPERSTRUCTURE

POLES AND CIRCUITS

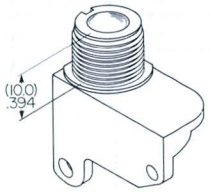
POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary — Normal	Down
SPDT	SCB15	ON	(ON)
	SCB16	ON	ON
CONNECTED TERMINALS		1-3	1-2
SCHEMATIC			
DPDT	SCB25	ON	(ON)
	SCB26	ON	ON
CONNECTED TERMINALS		1-3 4-6	1-2 4-5
SCHEMATIC			

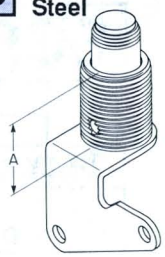
Terminal numbers are not actually on the switch.

HOUSINGS

P Plastic (for Momentary only)

S Steel





"A" = 11.2mm (Mom.) & 15.5mm (Alternate Act.)

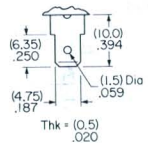
RATINGS

10 Long Life 10A @ 125/250V AC

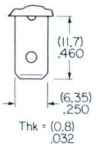
15 High Capacity 15A @ 125/250V AC

TERMINALS

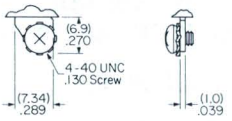
A .187" Quick Connect



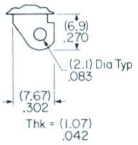
B .250" Quick Connect



C Screw



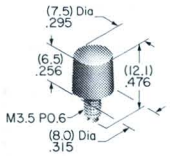
D Solder Lug



CAPS & SHROUDS

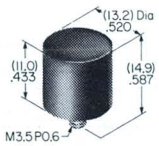
For Momentary Action Models

1 AT078 .315" Dia. Screw-on Cap
Colors: A B C E F G H
Polystyrene



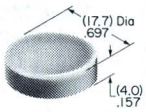
2 AT079 .394" Dia. Screw-on Cap
Colors: A B C E F G H
Polystyrene

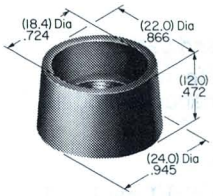
3 AT414 .520" Dia. Screw-on Cap
Colors: A B C D E F G H
Polystyrene



For Momentary or Alternate Action Models

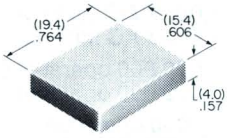
4 Round Cap & Shroud

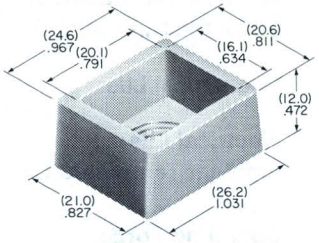




Cap Colors: A B C F G H
Shroud Colors: A B H
Material: Polycarbonate

5 Rectangular Cap & Shroud





Cap Colors: A B C F G H
Shroud Colors: A B H
Material: Polycarbonate

Color Codes: **A** Black **B** White **C** Red **D** Orange **E** Yellow **F** Green **G** Blue **H** Gray

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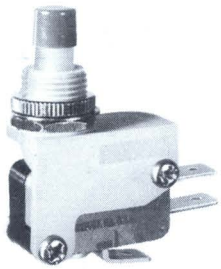
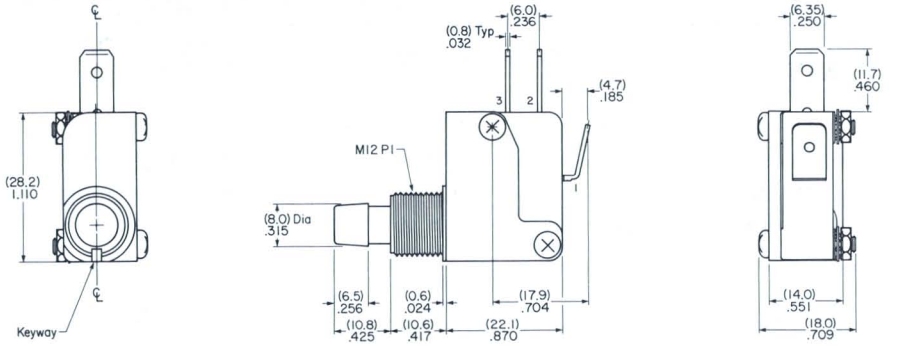
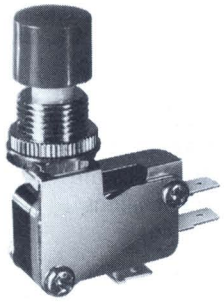
NKK SERIES SCB PUSHBUTTON SWITCHES

SNAP SWITCH/PUSHBUTTON SUPERSTRUCTURE

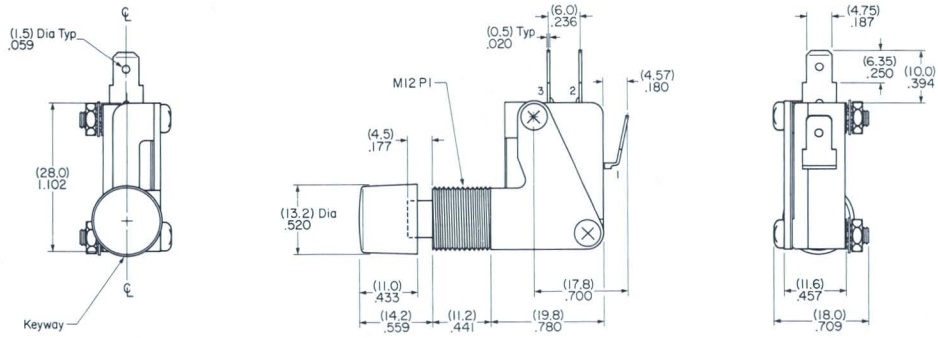


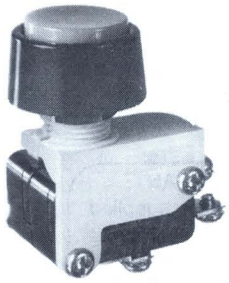
SCB15P10B-1C Model Shown



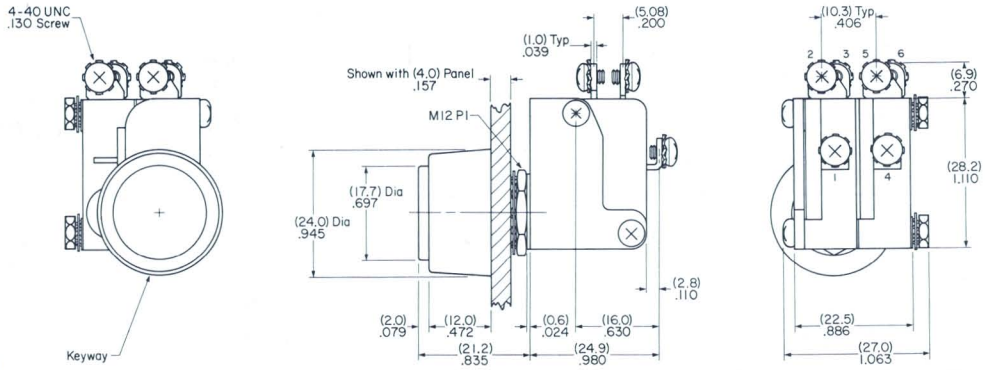


SCB15S10A-3C Model Shown

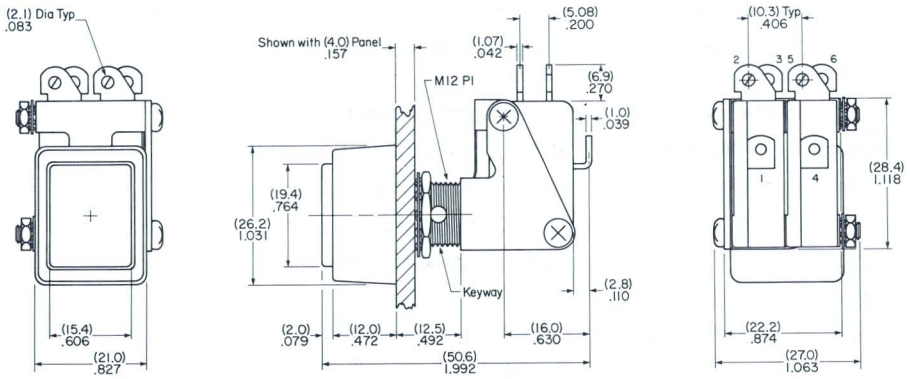




SCB25P10C-4CA Model Shown



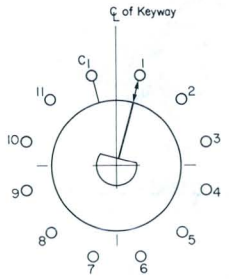
SCB26S10D-5CA Model Shown



NKK SERIES HS ROTARY SWITCHES

12 AMP/SHORTING & NONSHORTING/30° INDEXING

POLES, CIRCUITS, & BODY DEPTHS

POLE	MODEL	NUMBER OF POSITIONS	STOPPER SETTINGS	NUMBER OF TERMINALS	SCHEMATICS	BODY DEPTHS
SP	HS16-1 HS16-1S HS16-1N HS16-1SN	2-11 2-11 2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11	1 COMM, 11 LOAD 1 COMM, 11 LOAD 1 COMM, 11 LOAD 1 COMM, 11 LOAD		24.5mm .965"
DP	HS16-2 HS16-2S HS16-2N HS16-2SN	2-11 2-11 2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11	2 COMM, 22 LOAD 2 COMM, 22 LOAD 2 COMM, 22 LOAD 2 COMM, 22 LOAD		34.5mm 1.358"
3P	HS16-3 HS16-3S HS16-3N HS16-3SN	2-11 2-11 2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11	3 COMM, 33 LOAD 3 COMM, 33 LOAD 3 COMM, 33 LOAD 3 COMM, 33 LOAD	On each deck of multi-pole devices common and load terminals are in the same positions as shown in this schematic. The switch is viewed from the shaft end and is shown in position 1. Terminals numbers are on the switch.	44.5mm 1.752"
4P	HS16-4 HS16-4S HS16-4N HS16-4SN	2-11 2-11 2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11	4 COMM, 44 LOAD 4 COMM, 44 LOAD 4 COMM, 44 LOAD 4 COMM, 44 LOAD		54.5mm 2.146"
5P	HS16-5 HS16-5S HS16-5N HS16-5SN	2-11 2-11 2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11	5 COMM, 55 LOAD 5 COMM, 55 LOAD 5 COMM, 55 LOAD 5 COMM, 55 LOAD		64.5mm 2.539"
6P	HS16-6 HS16-6S HS16-6N HS16-6SN	2-11 2-11 2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11 2, 3, 4 . . . 11	6 COMM, 66 LOAD 6 COMM, 66 LOAD 6 COMM, 66 LOAD 6 COMM, 66 LOAD	**IMPORTANT:** Switches are supplied without UL marking unless specified. See Supplement for instructions.	74.5mm 2.933"

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	12A @ 125V AC 6A @ 250V AC
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,500V AC minimum
Mechanical Life:	15,000 operations minimum
Electrical Life:	7,500 operations minimum
Indexing:	30°
Range of Operating Torque:	5.5 ~ 6.5 kg-cm for first pole 0.5 kg-cm for each additional pole
UL Recognition:	HS16 1-pole ~ 6-pole

SUFFIX CODES

Circuit Types

No Code = Nonshorting **S** = Shorting

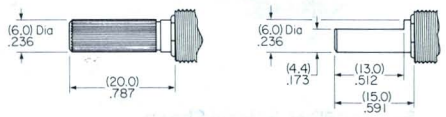
Examples:

HS16-1 is a single pole nonshorting switch

HS16-2S is a double pole shorting switch

Shaft Types

No Code = Knurled **N** = D Flat



Rotaries

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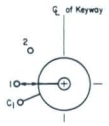
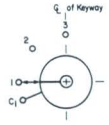
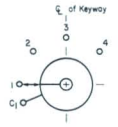
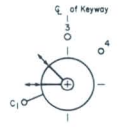
NKK SERIES HS ROTARY SWITCHES

STANDARD SIZE/6 AMP/NONSHORTING/45° INDEXING

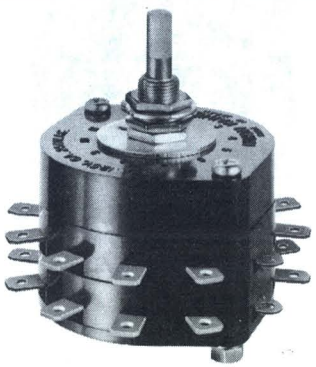
POLES, CIRCUITS, & BODY DEPTHS

POLE	MODEL	NUMBER OF POSITIONS	STOPPER SETTINGS	NUMBER OF TERMINALS	SCHEMATICS	BODY DEPTHS
SP	HS13-X	2	FIXED	1 COMM, 2 LOAD		20.0mm .787"
SP	HS13-Y	2-3	FIXED	1 COMM, 3 LOAD		20.0mm .787"
SP	HS13-Z	2-4	FIXED	1 COMM, 4 LOAD		20.0mm .787"
DP	HS13-W	2	FIXED	1 COMM, 2 LOAD		20.0mm .787"

The switch is viewed from the shaft end and is shown in position 1. Terminal numbers are on the switch.

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	6A @ 125V AC 3A @ 250V AC 5A @ 30V DC
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,500V AC minimum
Mechanical Life:	15,000 operations minimum
Electrical Life:	7,500 operations minimum
Indexing:	45°
Range of Operating Torque:	1.5 ~ 2.4 kg-cm



HS16-2N Model Shown

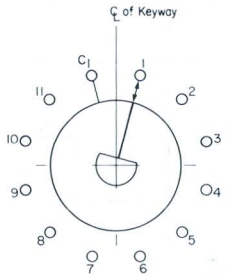
HS13-X Model Shown

Rotaries

NKK SERIES PS ROTARY SWITCHES

30 AMP/NONSHORTING/ADJUSTABLE STOP/30° INDEXING

POLES, CIRCUITS, & BODY DEPTHS

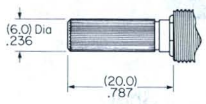
POLE	MODEL	NUMBER OF POSITIONS	STOPPER SETTINGS	NUMBER OF TERMINALS	SCHEMATICS	BODY DEPTHS
SP	PS1 PS1-N	2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11	1 COMM, 11 LOAD 1 COMM, 11 LOAD		24.5mm .965"
DP	PS2 PS2-N	2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11	2 COMM, 22 LOAD 2 COMM, 22 LOAD		42.0mm 1.654"
3P	PS3 PS3-N	2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11	3 COMM, 33 LOAD 3 COMM, 33 LOAD	On each deck of multi-pole devices, common and load terminals are in the same positions as shown in this schematic. The switch is viewed from the shaft end and is shown in position 1. Terminals numbers are on the switch.	59.5mm 2.343"
4P	PS4 PS4-N	2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11	4 COMM, 44 LOAD 4 COMM, 44 LOAD		77.0mm 3.031"
5P	PS5 PS5-N	2-11 2-11	2, 3, 4 . . . 11 2, 3, 4 . . . 11	5 COMM, 55 LOAD 5 COMM, 55 LOAD		94.5mm 3.720"

GENERAL SPECIFICATIONS

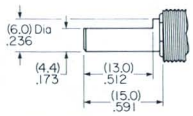
Electrical Capacity: (Resistive Load)	30A @ 125/250V AC
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,500 V AC minimum
Mechanical Life:	10,000 operations minimum
Electrical Life:	5,000 operations minimum
Indexing:	30°
Range of Operating Torque:	1.4 kg-cm for each pole

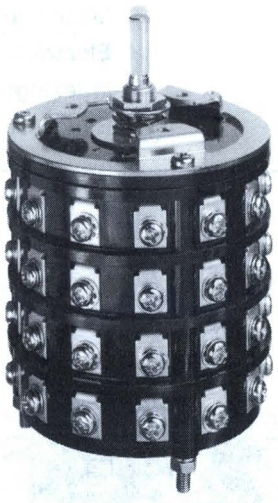
SHAFT TYPES

No Code = Knurled



N = D Flat





PS4 Model Shown

Rotaries

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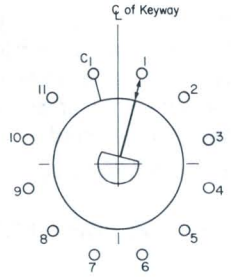
NKK SERIES TS ROTARY SWITCHES

STANDARD SIZE/6 AMP/NONSHORTING/30°INDEXING

POLES, CIRCUITS, & BODY DEPTHS

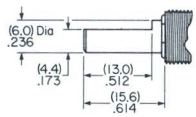
POLE	MODEL	NUMBER OF POSITIONS	STOPPER SETTINGS	NUMBER OF TERMINALS	SCHEMATICS	BODY DEPTHS
SP	TS1-N	2-11	2, 3, 4 . . . 11	1 COMM, 11 LOAD	 On each deck of multi-pole devices common and load terminals are in the same positions as shown in this schematic. The switch is viewed from the shaft end and is shown in position 1. Terminals numbers are on the switch.	22.0mm .866"
DP	TS2-N	2-11	2, 3, 4 . . . 11	2 COMM, 22 LOAD		34.0mm 1.339"
3P	TS3-N	2-11	2, 3, 4 . . . 11	3 COMM, 33 LOAD		46.0mm 1.811"
4P	TS4-N	2-11	2, 3, 4 . . . 11	4 COMM, 44 LOAD		58.0mm 2.283"
5P	TS5-N	2-11	2, 3, 4 . . . 11	5 COMM, 55 LOAD		70.0mm 2.756"

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	6A @ 125/250V AC
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,500V AC minimum
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Indexing:	30°
Range of Operating Torque:	For first pole: 0.9 kg-cm For additional poles: (0.7 kg-cm X total number of poles) + 1.3 kg-cm

TS5-N Model Shown

SHAFT TYPE



N = D Flat

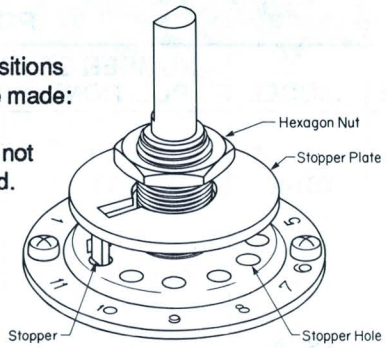
Rotaries

1-5 POLE/BUSHING MOUNT

STOPPER SETTING

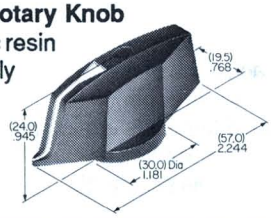
Each switch is supplied with the stopper plate set for the maximum number of positions allowed for that model. Prior to installation, the desired stopper setting should be made:

1. Be sure the shaft is turned counterclockwise to the extreme left. If the shaft is not turned counterclockwise to the extreme left, proper setting cannot be achieved.
2. Loosen the nut far enough to allow raising the stopper plate for resetting.
3. Insert the stopper in the numbered hole for the desired stopper setting. Satisfactory switch functioning cannot be assured if the stopper plate is not properly positioned.
4. Tighten the nut firmly against the stopper plate.

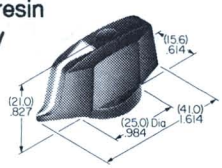


KNOBS FOR D-FLAT SHAFTS

AT431
Large Rotary Knob
Phenolic resin
Black only

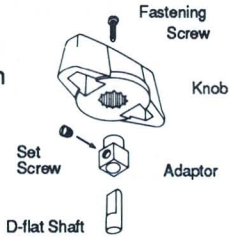


AT432
Small Rotary Knob
Phenolic resin
Black only



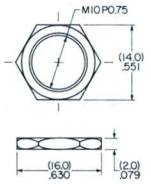
KNOB ORIENTATION

The rotary knobs used on the D-flat shafts can be oriented on the switch to suit the customer's particular front panel needs simply by sliding the knob over the square adaptor at the preferred orientation.

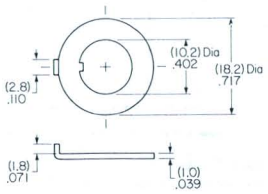


HARDWARE, PANEL CUTOUTS, & MAXIMUM EFFECTIVE PANEL THICKNESS

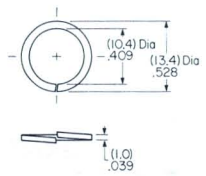
AT526 Hex Mounting Nut
Nickel/steel



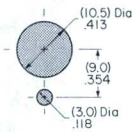
AT518 Locking Ring
Chromate/zinc/steel



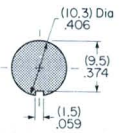
AT520 Split Lockwasher
Chromate/zinc/steel



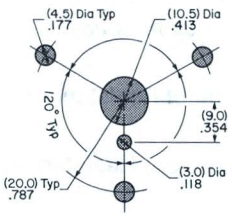
HS13 Models:
3.8mm (.150")
HS16 & TS Models
4.8mm (.189")



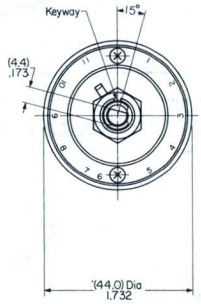
HS13 Models:
4.8mm (.189")
HS16 & TS Models:
5.8mm (.228")

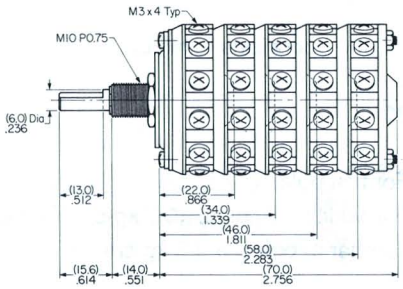


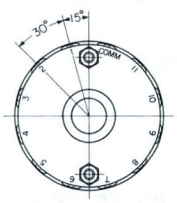
PS Models:
4.8mm (.189")
Mounting Screws
Supplied



Dimensions for TS







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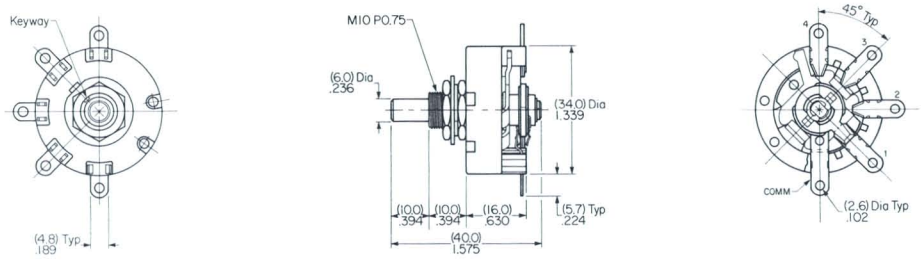
NKK SERIES HS/PS/TS/ROTARIES

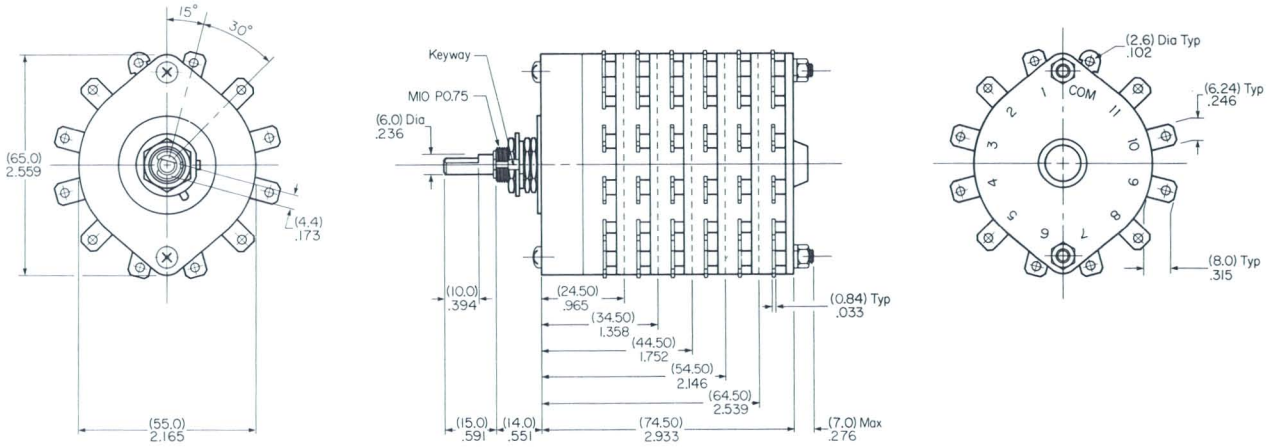
1-5 POLE/BUSHING MOUNT

Dimensions for HS13

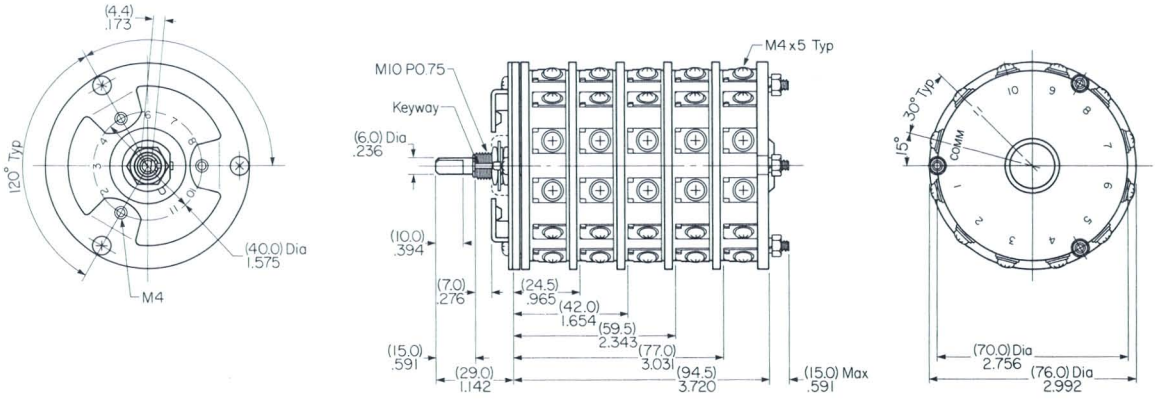


Terminals on each model: HS13-X 1 & 2; HS13-Y 1, 2 & 3; HS13-Z 1, 2, 3 & 4; HS13-W 3 & 4.

Dimensions for HS16 with D-flat Shaft (suffix code N)



Dimensions for PS



Rotaries

NOTES

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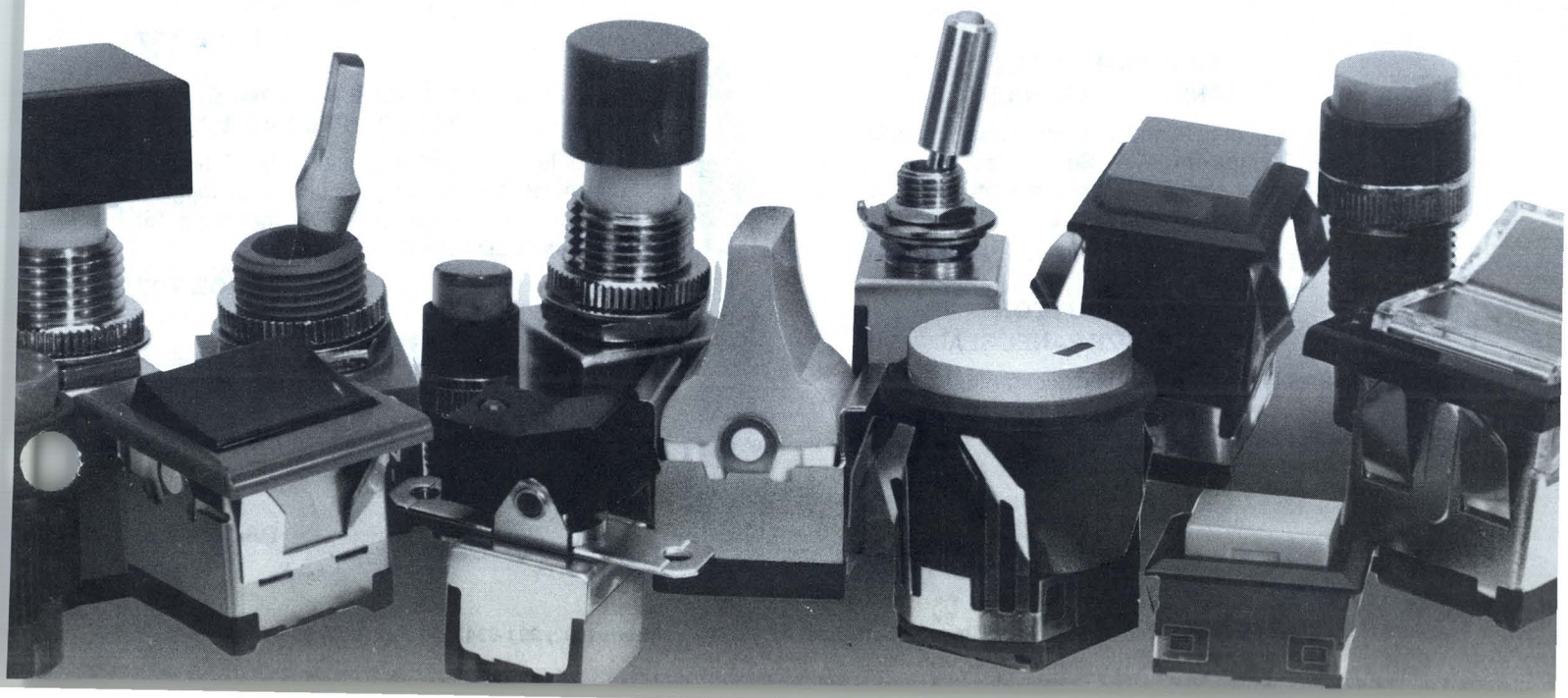
ILLUMINATED SWITCHES

TEN DISTINCTIVE SERIES

• PUSHBUTTONS • ROCKERS • TOGGLES



NKK ILLUMINATED

PUSHBUTTONS/ROCKERS/TOGGLES

NKK's illuminated switch line offers an extensive variety of pushbutton, rocker, and toggle models which utilize LED, neon and incandescent lamps. The variations include micro-subminiature to standard size devices; easy snap-in and bushing mounting styles; 0.4VA to 20 amp ratings; solder lug, PC and quick connect terminals; countless color combinations; square, round, and rectangular shapes. (Relative sizes are shown below.) Illuminated MS Series slides are in Section M, SS Series slides are in Section C, and illuminated JB and JF Series keypads are in Section J.

HB PUSHBUTTON
SUPER-SUBMINIATURE/PANEL MOUNTED

1 pole, alternate action and momentary circuits. 0.1 amp rating. Rear panel bushing mounting. Square or round shapes. LED lighted.

PAGE T3

UB PUSHBUTTON
LOW PROFILE/SNAP ACTION

1-2 pole, momentary or alternate action circuits. 5 amp or 0.4VA ratings. PCB or snap-in mount. Solder lug or straight PC terminals. LED lighted.

PAGE T13

KB PUSHBUTTON
MINIATURE/SNAP-ACTING

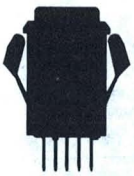
1-2 pole, maintained and momentary circuits rated at 1 amp or 0.4VA. Bushing or snap-in mounting. Square, round or rectangular shapes. Incandescent, neon or LED illumination.

PAGE T19

YB PUSHBUTTON
SHORT BODY/SNAP ACTION

1-2 pole, momentary or alternate action circuits. 3 amp or 0.4VA ratings. Bushing or snap-in mount. With or without panel seal. Incandescent and single or bicolor LED illumination.

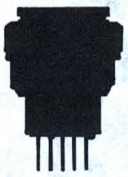
PAGE T35



LB PUSHBUTTON
STANDARD SIZE/SNAP-IN

1-2 pole, maintained and momentary circuits rated 3 amps or 0.4VA. Square, round or rectangular shapes. Snap-in mounting. Incandescent, neon or LED lighted.

PAGE T51



LB PUSHBUTTON
STANDARD SIZE/PANEL SEAL

1-2 pole, maintained and momentary circuits rated 3 amps or 0.4VA. Round shape. Panel sealed. Rear panel mounting. Incandescent, neon or LED lighted.

PAGE T65

DLB PUSHBUTTON
STANDARD SIZE/POWER RATED

2 pole, momentary or alternate action circuits. 5 amp or 0.4VA ratings. Bushing or snap-in mounting. Square or round caps. LED, incandescent, or neon lamps.

PAGE T71

MLW ROCKER & PADDLE
MINIATURE/SNAP-IN

1-2 pole, momentary or maintained circuits. 5 amp rating. Snap-in mounted. Incandescent, neon, or LED illumination.

PAGE T79

LW ROCKERS
STANDARD SIZE/POWER RATED

The dual lamp model is 2 pole in maintained or momentary circuits 10 amp and 6 amp ratings, snap-in mounting and incandescent or neon lamps. The 20 amp model is single pole, single throw with neon lamp and flush panel mount.

PAGE T89, 95

M2100 ROCKER
SUBMINIATURE/LED TIPPED ACTUATOR

1-2 pole, maintained circuits only. 6 amp or 0.4VA ratings. Flat frame mount. Single or bicolor synchronous or isolated LED.

PAGE T97

M2100 TOGGLE & PADDLE
SUBMINIATURE/LED TIPPED ACTUATOR

1-2 pole. Maintained circuits only. 6 amp or 0.4VA ratings. Bushing mounting for toggles. Snap-in and bracketed PCB mounting for paddles. LED lighted.

PAGE T97

TL TOGGLES
STANDARD SIZE/LED TIPPED OR LUMINISCENT

1-2 pole, maintained circuits only with isolated lamp circuits. 6 amp and 3 amp ratings. 12mm bushing mounted.

PAGE T109

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NKK SERIES HB

SUPER-SUBMINIATURE/REAR PANEL MOUNTING

DISTINCTIVE FEATURES

LED and spot illumination available. Front panel relamping.

Compact front panel design with .354″ square or round shroud size.

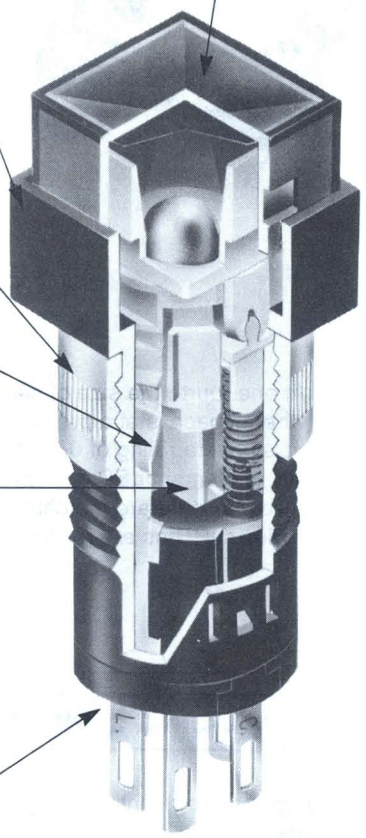
Rear panel threaded mounting. Behind panel depth of less than one inch. 8mm (.315″) body diameter fits common size panel cutout.

Latchdown feature gives indication of circuit status. Audible and tactile feedback with smooth and responsive operation.

Dual, sliding contacts with self-cleaning action provide contact stability, high reliability and increased operating life.

Minimal contact bounce is achieved with sliding contact mechanism.

Molded-in terminals lock out flux, dust and other contaminants.



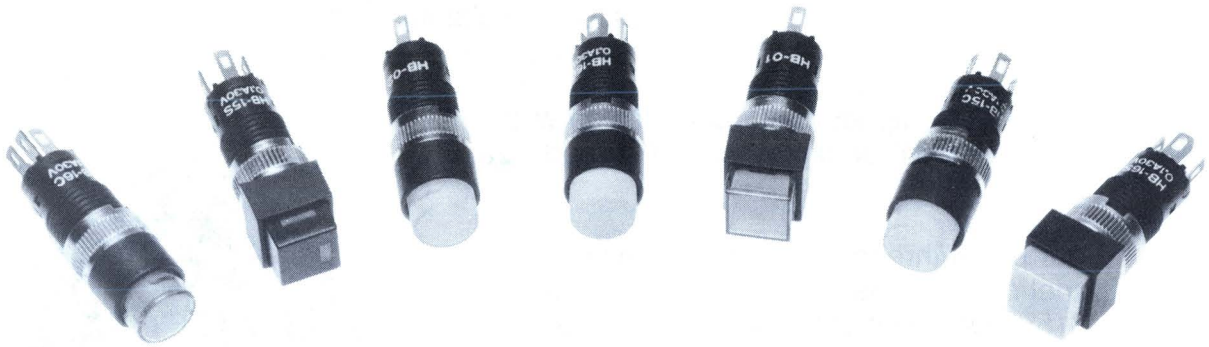
Actual Size

Longer normally closed terminal facilitates wiring and soldering.

NKK SERIES HB

SUPER-SUBMINIATURE/REAR PANEL MOUNTING

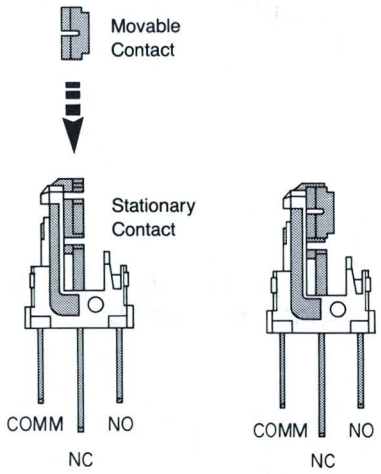
APPLICATION DATA



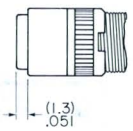
At one-fourth the size of standard lighted devices, HB switches are uniquely suited to applications where space is at a premium. These super-subminiature SPDT switches with silver solder lug terminals have a rating of 0.1 amp @ 30V. Square or round shrouds vary the front panel appearance. A single element LED provides illumination for colored transparent caps and spot illuminated caps. Also available are matching indicators. Solid caps are suitable for nonilluminated applications. HB series switches are recognized by Underwriters Laboratories Inc. (UL File No. E44145).

SLIDING CONTACT MECHANISM

The unique sliding contact mechanism offers benefits unavailable in conventional mechanisms. A dual wiping movable contact slides along the stationary contacts to provide excellent contact stability and increased operating life. The contact operation is break before make. Contact reliability is assured since the contacts are wiped clean with each actuation.



LATCHDOWN MECHANISM



The latchdown feature on alternate action circuits provides visible, audible and tactile feedback. The cap extends 1.3mm (.051") above the shroud when in the latchdown position. Smooth and responsive operation is achieved with the design of this mechanism.

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NKK SERIES HB PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/REAR PANEL MOUNTING

GENERAL SPECIFICATIONS

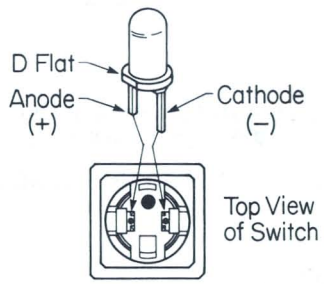
Electrical Capacity:	0.1A maximum @ 30V AC/DC maximum
Contact Resistance:	50 milliohms maximum
Insulation Resistance:	100 megohms minimum @ 500V DC
Dielectric Strength:	500V AC minimum
Mechanical Life:	100,000 operations minimum
Electrical Life:	50,000 operations minimum
Ambient Temp Range:	Illuminated: −20°C through +50°C (−4°F through +122°F)
	Nonilluminated: −20°C through +70°C (−4°F through +158°F)
Pretravel:	2.2mm (.087″)
Overtravel:	0.8mm (.031″)
Total Travel:	3.0mm (.118″)
Nominal Operating Force:	350 grams

MATERIALS AND FINISHES

Housing	Fiberglass reinforced polyamide
Base	Fiberglass reinforced polyamide
Movable Contact	Phosphor bronze with silver plating
Stationary Contacts	Phosphor bronze with silver plating
Common Terminal	Phosphor bronze with silver plating
End Terminals	Phosphor bronze with silver plating
Lamp Terminal	Phosphor bronze with tin plating

LED INSERTION

Correctly orient the LED by placing the D flat opposite the black dot inside the actuator block.



Use of the Lamping Tool, AT111, simplifies LED insertion.

SERIES HB PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/REAR PANEL MOUNTING

TYPICAL SWITCH ORDERING EXAMPLE

HB 1 5 S K W01 — EE

POLE	
1	SPDT

HOUSING	
K	Black only

CIRCUITS		
5	ON	(ON)
( ) = Momentary		
6	ON	ON
Alternate Action with Latchdown		

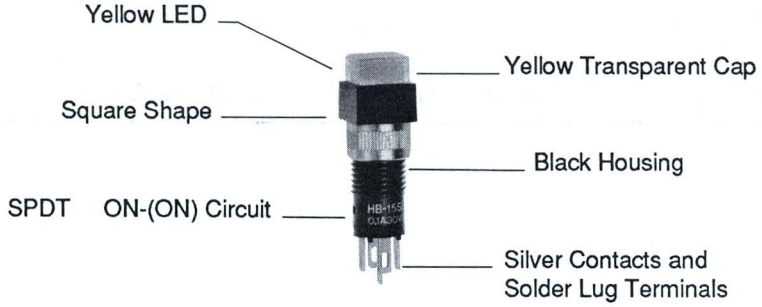
CONTACTS & TERMINALS	
W01	Silver Contacts and Solder Lug Terminals

SHAPES	
S	Square
C	Round

CAP TYPES AND COLOR COMBINATIONS	
Transparent Cap Cap/LED Colors	
CC	Red Cap for Red LED
EE	Yellow Cap for Yellow LED
FF	Green Cap for Green LED
Square Spot Illuminated Cap Cap/LED Colors	
AC	Square Black Cap for Red LED
AE	Square Black Cap for Yellow LED
AF	Square Black Cap for Green LED
Nonilluminated Cap Colors	
A	Black (square only)
B	White
C	Red
E	Yellow
F	Green
G	Blue

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (HB15SKW01-EE):

SERIES HB PUSHBUTTON



IMPORTANT: Switches are supplied without UL marking unless specified. See Supplement for instructions.

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NKK SERIES HB PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/REAR PANEL MOUNTING

POLES AND CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary Normal	Down
SPDT	HB15	ON	(ON)
	HB16	ON	ON
CONNECTED TERMINALS		1–3	1–2

SCHEMATIC: 2 — I (COMM) — 3; L(+) — (-)L

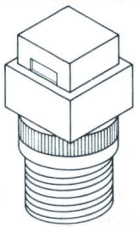
Note: LED circuit is isolated & requires an external switch.

Terminal numbers not actually on switch, but labels "NO, NC, C, L" are.

SHAPES

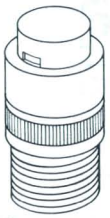
S **.354″ Square Shroud**

Square shroud for use with square cap. The shroud is an integral part of the switch body and comes in black only.



C **.354″ Round Shroud**

Round shroud for use with round cap. The shroud is an integral part of the switch body and comes in black only.



HOUSING

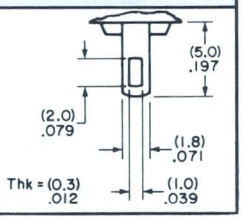
K Housing available in black only.

RATING, CONTACTS AND TERMINAL TYPE

W01 **0.1 Amp Rating**

Silver Contacts

Solder Lug Terminals



LED

AT616
Single Element

Colors Available:
Red, Yellow, Green

Used with Transparent, Spot Illuminated, and Indicator Caps.

ELECTRICAL SPECIFICATIONS

		Red	Yellow	Green
Forward Peak Current	I_{FM}	30mA	20mA	30mA
Continuous Forward Current	I_F	24mA	16mA	24mA
Forward Voltage	V_F	2.04V	1.88V	2.02V
Reverse Peak Voltage	V_{RM}	5V	5V	5V
Current Reduction Rate Above 25°C	ΔI_F	0.40mA/°C	0.26mA/°C	0.40mA/°C

The electrical specifications shown above are determined at a basic temperature of 25°C. LED circuit is independent of switch operation. The LED dimension drawing appears in the accessories section at the end of this catalog. If the source voltage exceeds the LED's rated voltage, the required ballast resistor value can be calculated by using the formula at the end of this catalog.

NKK SERIES HB PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/REAR PANEL MOUNTING

CAP TYPES & COLOR COMBINATIONS

Color Codes: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue

Transparent Cap for LED

Lens & Diffuser/LED Color Codes:

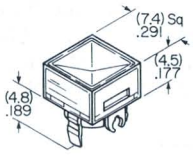
CC

EE

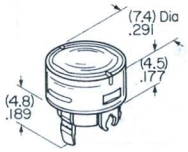
FF

Polycarbonate

AT4031 Square



AT4032 Round



Transparent Colored Lens

Transparent Colored Diffuser

Colored LED AT616

Spot Illuminated Cap for LED

Black Opaque Cap/LED Color Codes:

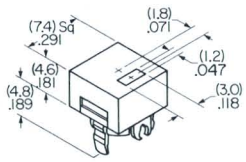
AC

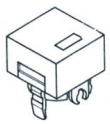
AE

AF

Polycarbonate

AT4052 Square





Black Cap with Translucent Window

Colored LED AT616

Nonilluminated Cap

Cap Color Codes:

A (square only)

B

C

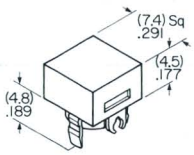
E

F

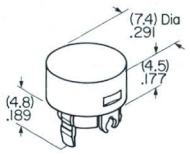
G

Polycarbonate

AT4035 Square

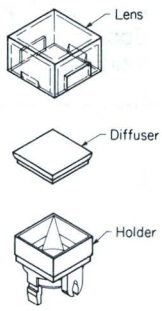


AT4036 Round



INSCRIPTIONS

Due to the super-subminiature size of HB caps, only a single character or symbol may be placed on the lens or diffuser. Details regarding hot stamping or engraving can be obtained from the factory.



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NKK SERIES HB PUSHBUTTON SWITCHES

SUPER-SUBMINIATURE/REAR PANEL MOUNTING

MOUNTING

Recommended Panel Thickness:

.5mm ~ 5mm (.020″ ~ .197″)

Overtightening the mounting nut may damage the switch housing.

PCB Mounting:

Solder lug terminals are spaced .100″ x .200″. This enables PCB mounting which can be accomplished by elongating PC board holes to .080″.

SOLDERING & WIRING SPECS

Soldering:

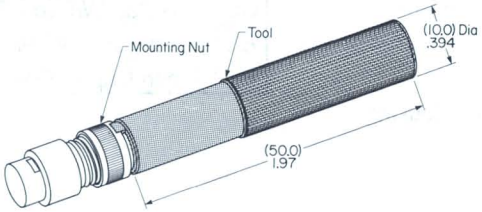
3 seconds at 350°C 5 seconds at 270°C

Wiring Specifications:

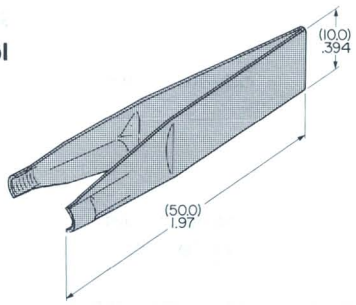
The .039″ x .079″ oblong hole accommodates one solid or stranded 20-gauge wire or two 22-gauge wires.

TOOLS

AT110
Socket Wrench

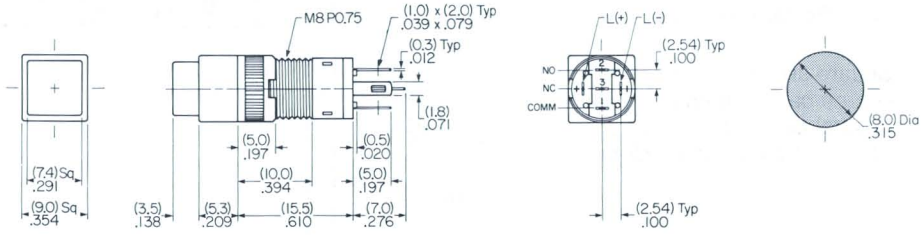


AT111
Lamping Tool



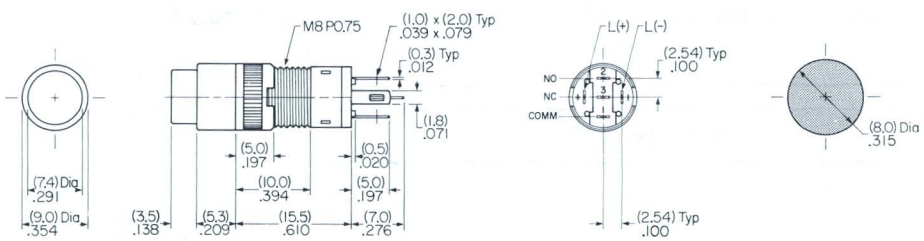
Square/Solder Lug Terminals/Single Pole

HB15SKW01-CC Model Shown



Round/Solder Lug Terminals/Single Pole

HB16CKW01-CC Model Shown



SERIES HB INDICATORS

SUPER-SUBMINIATURE/REAR PANEL MOUNTING

TYPICAL INDICATOR ORDERING EXAMPLE

HB 01 K W01 — CC

SHAPES	
01	Square
02	Round

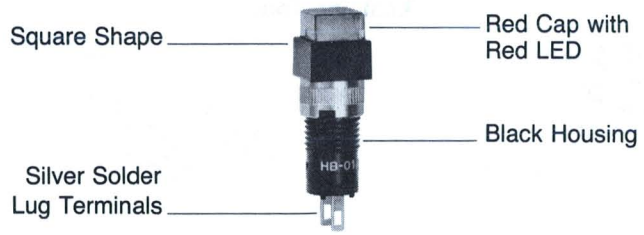
HOUSING	
K	Black only

TERMINAL TYPE	
W01	Silver Solder Lug

CAP & LED COLORS	
CC	Red Cap W/Red LED
EE	Yellow Cap W/Yellow LED
FF	Green Cap W/Green LED

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (HB01KW01-CC):

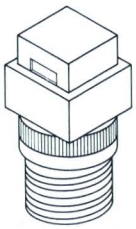
SERIES HB INDICATOR



SHAPES

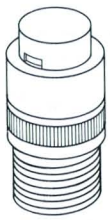
01 **.354″ Square Shroud**

Square shroud for use with square cap. The shroud is an integral part of the indicator body and comes in black only.



02 **.354″ Round Shroud**

Round shroud for use with round cap. The shroud is an integral part of the indicator body and comes in black only.

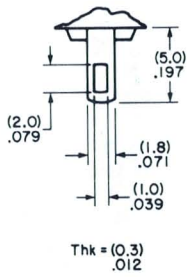


HOUSING

K Housing available in black only.

TERMINAL TYPE

W01 **Silver Solder Lug Terminals**



LED

AT616
Single Element

Colors Available:
Red, Yellow, Green

Electrical specifications appear with the previous HB switch data.

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SERIES HB INDICATORS

SUPER-SUBMINIATURE/REAR PANEL MOUNTING

CAP & LED COLORS

Color Codes:

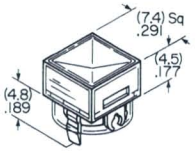
CC Red Lens & Diffuser/Red LED

EE Yellow Lens & Diffuser/Yellow LED

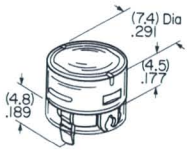
FF Green Lens & Diffuser/Green LED

Polycarbonate

AT4033 Square



AT4034 Round



Used with LED AT616

MOUNTING

Recommended Panel Thickness:

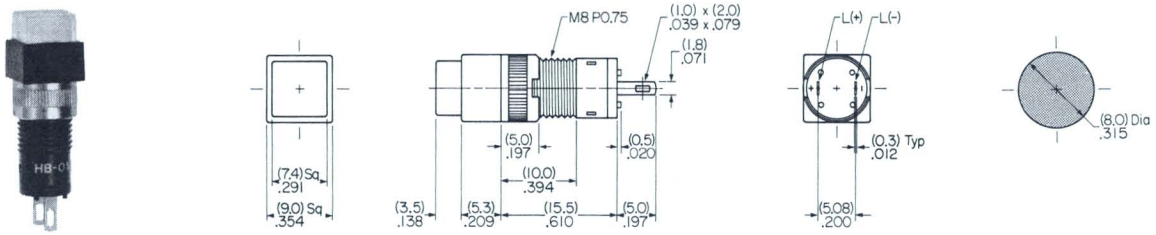
.5mm ~ 5mm (.020" ~ .197")

Overtightening the mounting nut may damage the indicator housing.

PCB Mounting:

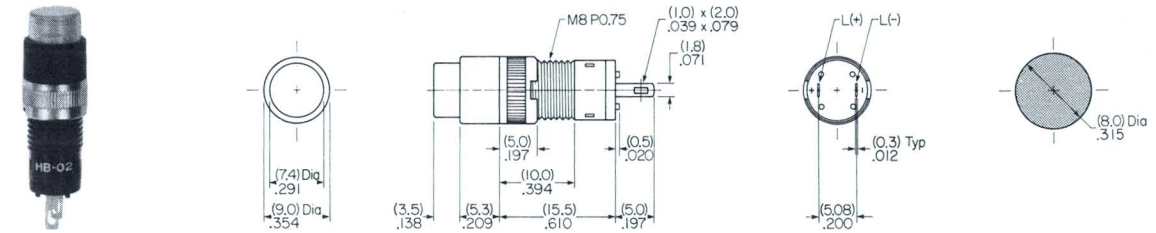
Solder lug terminals are spaced .100" x .200". This enables PCB mounting which can be accomplished by elongating PC board holes to .080".

Square/Solder Lug Terminals



HB01KW01-EE Model Shown

Round/Solder Lug Terminals



HB02KW01-FF Model Shown

NOTES

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NKK SERIES UB

SHORT BODY/SNAP ACTION/PCB & SNAP-IN MOUNTING

DISTINCTIVE FEATURES

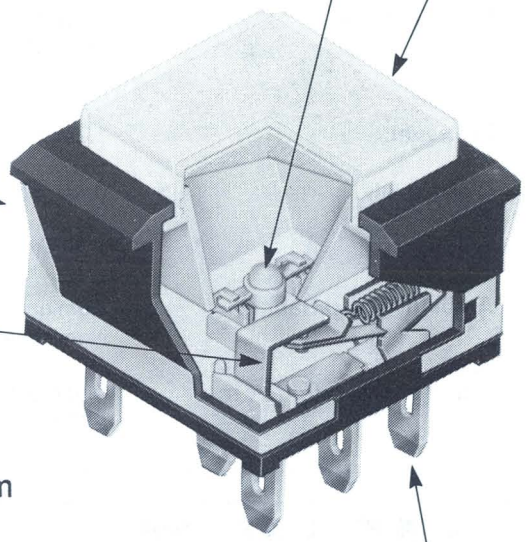
Light diffusion designed to give bright, full surface illumination.

Long life LED is an integral part of the switch.

Combination of PCB mountability and short body allows use in compact applications.

Extra low profile of a half inch.

Small behind panel dimension for snap-in mounting in tight spaces.

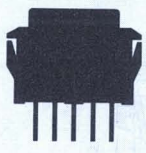


Snap-acting contact mechanism provides sensitive actuation with audible feedback.

Precision design of switching mechanism extends life.

Momentary and alternate action circuits available in the same space-saving body size.

Actual Size



Latchdown mechanism, independent of switching mechanism, gives visible, audible, and tactile indication of circuit status.

Terminals are epoxy sealed to lock out flux, solvents, and other contaminants.

Certified by Canadian Standards Association

NKK SERIES UB PUSHBUTTON SWITCHES

SHORT BODY/SNAP ACTION/PCB & SNAP-IN MOUNTING

GENERAL SPECIFICATIONS

Electrical Capacity: **(Resistive Load)**	5A @ 125/250V AC & 5A @ 30V DC for silver 0.4VA maximum @ 28V AC/DC maximum for gold (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	50 milliohms maximum for silver 100 milliohms maximum for gold
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	1,000,000 operations minimum for momentary action 200,000 operations minimum for alternate action
Electrical Life:	10,000 operations minimum for silver with resistive load of 5A @ 125V AC 100,000 operations minimum for silver with resistive load of 3A @ 125V AC 200,000 operations minimum for gold
Pretravel:	1.7mm (.067")
Overtravel:	0.6mm (.024")
Total Travel:	2.3mm (.091")
Ambient Temp Range:	Illuminated: -20°C through +50°C (-4°F through +122°F) Nonilluminated: -20°C through +70°C (-4°F through +158°F)
Nominal Operating Force:	160 grams for single pole 260 grams for double pole

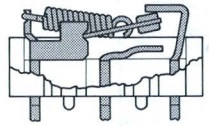
MATERIALS & FINISHES

Housing/Bezel	Glass fiber reinforced polyamide
Snap-in Frame	Stainless steel
Movable Contactor	Phosphor bronze
Movable Contact	Silver alloy or copper with gold plating over nickel
Stationary Contacts	Silver alloy or copper with gold plating over nickel
Power Terminals	Phosphor bronze with silver or gold plating
Switch Lamp Terminals	Phosphor bronze with nickel plating
Indicator Lamp Terminals	Brass with tin-lead plating
Base	Glass fiber reinforced diallylphthalate

SNAP-ACTION MECHANISM

The UB pushbutton has a single break snap-action contact mechanism. The combined butterfly formation and spring action of the movable contact create the quick-make, quick-break characteristic which limits arcing and prolongs electrical life. An added benefit of this design is the sensitive and audible actuation.

This switch is offered with momentary or alternate action in single or double pole configurations.



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SERIES UB PUSHBUTTON SWITCHES

SHORT BODY/SNAP ACTION/PCB & SNAP-IN MOUNTING

TYPICAL SWITCH ORDERING EXAMPLE

UB	1	5	SK	G	03	C	–	CJ

POLES

1	SPDT
2	DPDT

CIRCUITS

5	ON	(ON)
6	ON	ON
( ) = Momentary		

MOUNTING TYPES

SK	PCB Mount
KK	Snap-in Mount (solder lug only)

CONTACTS & RATINGS

W	Silver Rated 5A @ 125/250V AC
G	Gold Rated 0.4VA max @ 28V AC/DC max

TERMINALS

01	Solder Lug
03	Straight PC

LEDS

C	Red
E	Yellow
F	Green
N	Nonilluminated

CAP/DIFFUSER COLORS

Illuminated	
CC	Red/Red
EE	Yellow/Yellow
FF	Green/Green
JJ	Clear/Clear
CJ	Red/Clear
EJ	Yellow/Clear
FJ	Green/Clear
JC	Clear/Red
JE	Clear/Yellow
JF	Clear/Green

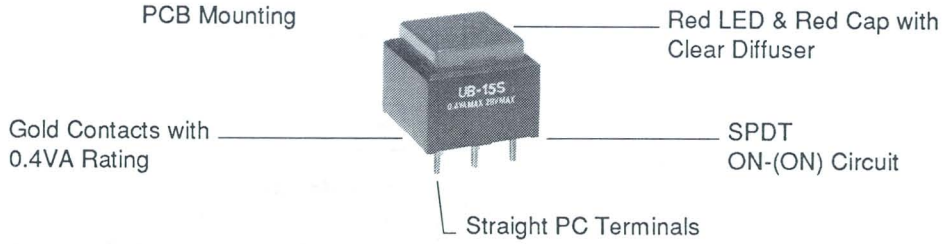
CAP COLORS

Nonilluminated	
B	White
C	Red
E	Yellow
F	Green
G	Blue

IMPORTANT: Switches are supplied without CSA marking unless specified. See Supplement for instructions.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (UB15SKG03C-CJ):

SERIES UB PUSHBUTTON



NKK SERIES UB PUSHBUTTON SWITCHES

SHORT BODY/SNAP ACTION/PCB & SNAP-IN MOUNTING

POLES AND CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary	
		Normal	Down
SPDT	UB15	ON	(ON)
	UB16	ON	ON
CONNECTED TERMINALS		1-3	1-2
SCHEMATICS Power/Lamp			
DPDT	UB25	ON	(ON)
	UB26	ON	ON
CONNECTED TERMINALS		1-3 4-6	1-2 4-5
SCHEMATICS Power/Lamp			

Terminal numbers are not actually on the switch. LED circuit is isolated and requires an external switch.

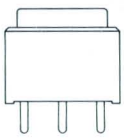
LED SPECIFICATIONS

Colors:		C Red	E Yellow	F Green
Forward Peak Current	I_{FM}	30mA	20mA	20mA
Continuous Fwd Current	I_F	20mA	15mA	15mA
Forward Voltage	V_F	2.0V	1.9V	1.95V
Reverse Peak Voltage	V_{RM}	5V	5V	5V
Current Reduction Rate Above 25°C	ΔI_F	0.40 mA/°C	0.27 mA/°C	0.27 mA/°C
Ambient Temp Range		-25°C ~ +70°C		

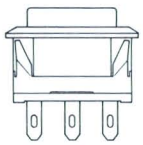
Single element LEDs are supplied as an integral part of UB devices & are not available separately. LED polarity markings are on the bottom of the switch. The electrical specifications shown are determined at a basic temperature of 25°C. If the source voltage exceeds rated voltage, a ballast resistor is required. Resistor value can be calculated by using the formula shown in the supplement.

MOUNTING TYPES

SK PC Board



KK Snap-in with Built-in Bezel



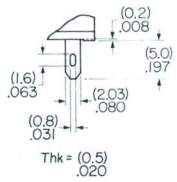
CONTACT MATERIALS & RATINGS

W Silver Rated 5A @ 125/250V AC

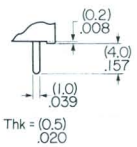
G Gold Rated 0.4VA maximum @ 28V AC/DC maximum

TERMINALS

01 Solder Lug



03 Straight PC



Lamp circuit is isolated from power circuit.

CAPS/DIFFUSERS & COLOR CODES

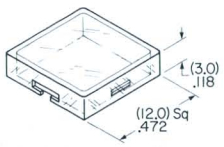
Available Colors:

C **F**

E **J**

Polycarbonate

AT4074 Transparent Cap for Illuminated



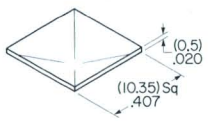
Available Colors:

C **F**

E **J**

Polycarbonate

AT4075 Diffuser for AT4074 Cap



Both cap & diffuser colors must be selected.

Available Colors:

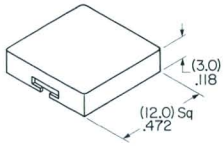
B **F**

C **G**

E

Polycarbonate

AT4073 Opaque Cap for Nonilluminated



Color Codes: **B** White **C** Red **E** Yellow **F** Green **G** Blue **J** Clear

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SERIES UB PUSHBUTTON SWITCHES

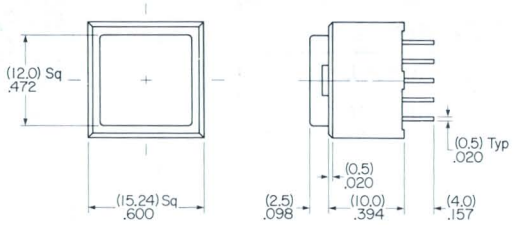
SHORT BODY/SNAP ACTION/PCB & SNAP-IN MOUNTING

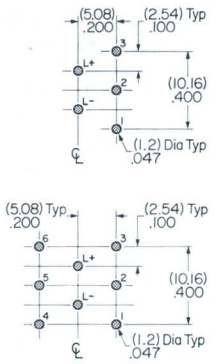
LATCHDOWN MECHANISM

The latchdown feature on alternate action circuits provides visible, audible, and tactile feedback. The cap extends 1.0mm (.039") above the body or built-in bezel when in the latchdown position.

Normal Position | Latchdown Position

Illuminated Switch/PCB Mount with Straight PC Terminals/Single & Double Pole

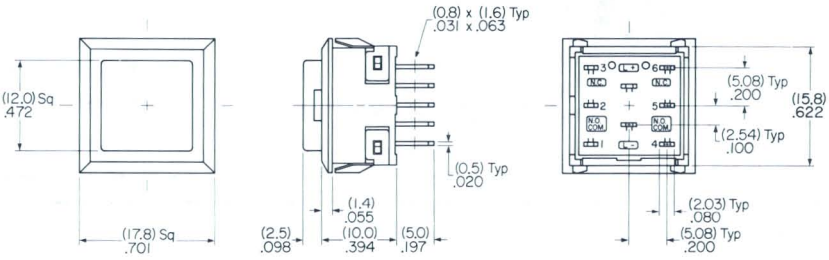




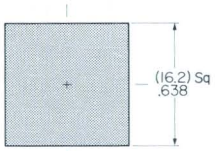
UB15SKG03C-CJ Model Shown

Single pole models do not have terminals 4, 5, & 6.

Illuminated Switch/Snap-in Mount with Solder Lug Terminals/Single & Double Pole



Panel Cutout



Panel Thickness
1 ~ 3.2mm (.039" ~ .126")

UB25KKW01C-CJ Model Shown

Single pole models do not have terminals 4, 5, & 6.

SOLDERING & WIRING SPECIFICATIONS

Soldering Time & Temperature Limits
3 seconds at 350°C
5 seconds at 270°C

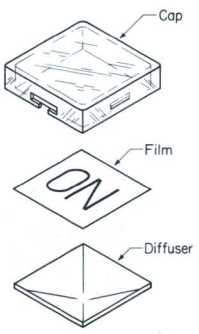
Terminal Holes are
.032" x .063" oblong & accommodate
1 solid 20 gauge wire or
2 solid or stranded 22 gauge wires

CAP LEGENDS

Several legending methods are available: pad printing (the preferred method for its long life), engraving, & film.

Film Inserting Specifications: Maximum film thickness 0.15mm (.006"), placed between the cap & diffuser.

Optional cap removal tool AT109 available; see Accessories section.



NKK SERIES UB INDICATORS

SHORT BODY/PCB & SNAP-IN MOUNTING

TYPICAL INDICATOR ORDERING EXAMPLE

UB 01K W03 C – JC

MOUNTING TYPES	
01K	PCB Mount
04K	Snap-in Mount (solder lug only)

TERMINALS	
W01	Silver Solder Lug
W03	Silver Straight PC

LEDS	
C	Red
E	Yellow
F	Green

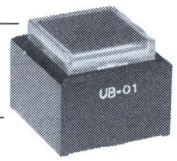
CAP/DIFFUSER COLORS	
CC	Red/Red
EE	Yellow/Yellow
FF	Green/Green
JJ	Clear/Clear
CJ	Red/Clear
EJ	Yellow/Clear
FJ	Green/Clear
JC	Clear/Red
JE	Clear/Yellow
JF	Clear/Green

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (UB01KW03C-JC):

SERIES UB INDICATOR

Red LED & Clear Cap

PCB Mounting

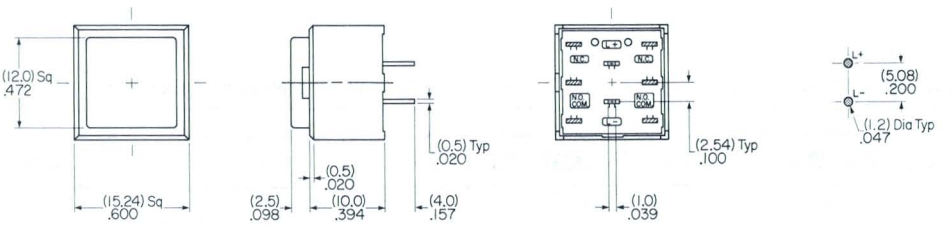


Silver Straight PC Terminals

Details about terminals, LED specifications, and cap information are on page T100.

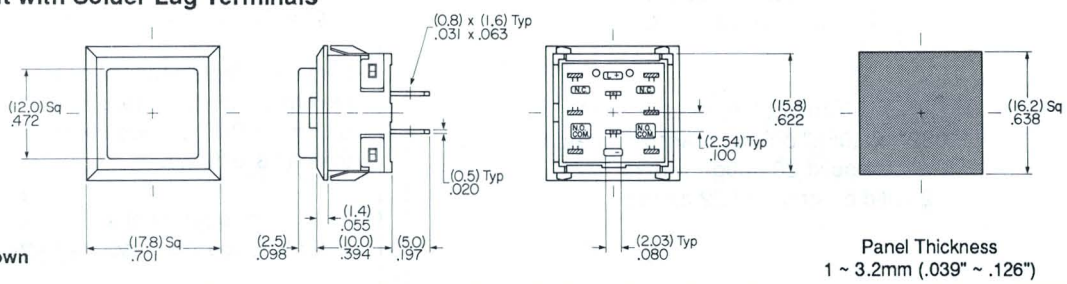
Indicator/PCB Mount with Straight PC Terminals

UB01KW03C-JC Model Shown



Indicator/Snap-in Mount with Solder Lug Terminals

UB04KW01C-JC Model Shown



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NKK SERIES KB

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

DISTINCTIVE FEATURES

Bright illumination with numerous color variations. Spot illumination available. Square, rectangular, and round shaped caps. Cap inscriptions are available.

Incandescent, LED, and neon lamps. Front panel relamping.

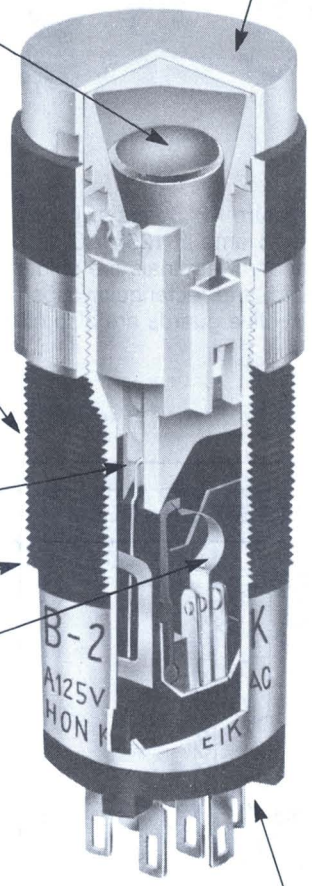
8mm (.315″) panel thickness capability. Rear panel bushing or snap-in mounting.

Stainless steel frame on snap-in models has a specially designed projection which prevents rotation and correctly orients switch in panel.

Latchdown feature gives indication of circuit status. Audible and tactile feedback with smooth and responsive operation.

12mm (.472″) body diameter.

Snap-action mechanism for long life.



Actual Size

Molded-in terminals lock out flux, dust, and other contaminants.

Optional PCB adaptors in straight and right angle types.

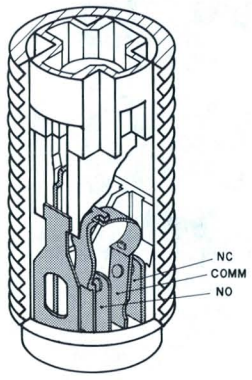
NKK SERIES KB

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

APPLICATION DATA

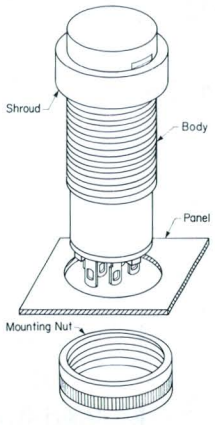
Miniature KB Series switches are available in single or double pole, maintained or momentary circuits rated 1 amp at 125V AC or 0.4VA. These round bodied switches are rear panel or snap-in mountable. Standard terminals are solder lug with optional adaptors for straight or right angle PC mounting. Square, round, and rectangular caps are available to match the shroud shapes. Optional splash covers or protective guards are also offered. Full face illumination is provided by LED, incandescent or neon lamp.

SNAP-ACTING MECHANISM



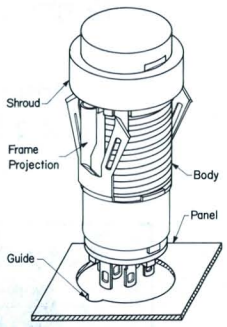
The KB pushbutton, available in single and double pole, utilizes a snap-acting contact mechanism which provides long electrical life and pronounced sensitivity. The contact mechanism is double throw with a normally closed and normally open contact. Tactile feedback is transmitted to the cap from an independent latchdown mechanism.

BUSHING MOUNTING



A nickel-plated brass nut (AT057) is used to fasten the switch in place from the back of the panel.

SNAP-IN MOUNTING



A stainless steel snap-in frame allows mounting from the front of the panel. In addition to ease of mounting and resistance to corrosion, the frame projection prevents rotation when inserted into the panel guide.

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NKK SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

GENERAL SPECIFICATIONS

	With Silver Contacts for Power Circuits	With Gold Contacts for Logic Level Circuits
Electrical Capacity: (Resistive Load)	1A @ 125V AC 1A @ 250V AC 1A @ 30V DC	0.4VA maximum @ 28V AC/DC max (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	50 milliohms maximum	50 milliohms maximum
Insulation Resistance:	1,000 megohm minimum @ 500V DC	1,000 megohm minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC min between contacts & case	750V AC minimum between contacts 1,500V AC min between contacts & case
Mechanical Life:	100,000 operations minimum	100,000 operations minimum
Electrical Life:	50,000 operations minimum	100,000 operations minimum
Contact Bounce:	0.3 ~ 0.8 milliseconds	0.3 ~ 0.8 milliseconds

Ambient Temp Range: -15°C through +50°C (+5°F through +122°F) for illuminated
-15°C through +70°C (+5°F through +158°F) for nonilluminated
Note: When used with a polyvinyl chloride splash cover, the lowest limit is 0°C (32°F).

Nominal Operating Force:

Single Pole	Double Pole
Maintained 100-250 grams	Maintained 150-350 grams
Momentary 100-200 grams	Momentary 150-300 grams

Travel: Pretravel 2.2mm (.087"); Overtravel 0.8mm (.031"); Total Travel 3.0mm (.118")

MATERIALS & FINISHES

Housing	Polyamide (94V-0 UL Flammability Rating)
Movable Contactor	Silver for power circuit Copper with gold plating for logic level circuit
Stationary Contacts	Silver for power circuit Copper with gold plating for logic level circuit
Housing Base	Polyamide (94V-0 UL Flammability Rating)
Terminal Base	Polybutylene terephthalate (94V-0 UL Flammability Rating)
Common Terminals	Phosphor bronze with silver flash plating for power circuit Phosphor bronze with gold flash plating for logic level circuit
End Terminals	Brass with silver flash plating for power circuit Brass with gold flash plating for logic level circuit
Lamp Terminals	Phosphor bronze with nickel flash plating

UL & CSA

KB switches are recognized by Underwriters Laboratories Inc. at the following rating:
1 amp @ 125/250V AC
1A @ 30V DC
0.4VA @ 28V AC/DC
UL File No. E44145

KB switches are certified by Canadian Standards Association at the following ratings:
1 amp @ 125/250V AC,
1A @ 30V DC, &
0.4VA @ 28V AC/DC max
CSA File Nos. LR 23535 and LR56017

SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

TYPICAL SWITCH ORDERING EXAMPLE

KB	1	5	C	K	W01

POLES	
1	SPDT
2	DPDT

CIRCUITS		
5	ON	(ON)
( ) = Momentary		
6	ON	ON
Alternate Action with Latchdown		

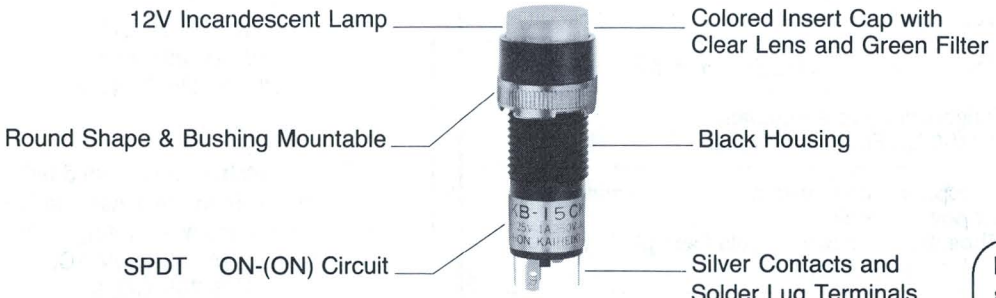
SHAPES	
Bushing Mounting	
S	Square
C	Round
R	Rectangular
Snap-in Mounting	
K	Square
M	Round
N	Rectangular

HOUSING	
K	Black only available

CONTACTS & TERMINALS	
W01	Silver Contacts and Solder Lug Terminals
G01	Gold Contacts and Solder Lug Terminals

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (KB15CKW01-12-JF):

SERIES KB PUSHBUTTON



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

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AND ASSEMBLY ORDERING EXAMPLE

— 12 — JF

LAMPS

Incandescent Lamp used with Solid Cap	
00	No Lamp
05	5 Volt
12	12 Volt
28	28 Volt

Incandescent Lamp used with Insert Cap	
05	5 Volt
12	12 Volt
28	28 Volt

Neon Lamp used with Insert Cap	
01	110 Volt

Incandescent or Neon Lamp used with Spot Illuminated Cap	
01	110 Volt
05	5 Volt
12	12 Volt
28	28 Volt

LED used with Spot Illuminated Cap	
10	Single Element
20	Double Element

LED Used with Cap for LED	
10	Single Element
20	Double Element

CAP TYPES & COLOR COMBINATIONS

Solid Cap Lens/Filter Colors			
AB	BF	*EB	*CC
*BB	BG	*FB	*FF
BC	*CB	*GB	*GG
*Standard Lens/Filter Combinations			

Insert Cap Lens/Filter Colors	
JB	Clear with White
JC	Clear with Red
JE	Clear with Yellow
JF	Clear with Green
JG	Clear with Blue

Insert Cap Lens/Filter Colors		
JB	JC	JE
Contact factory for JJ & CC.		

Square Spot Illuminated Cap Cap/Lamp Colors	
AB	Square Black Cap only with White Window

Square Spot Illuminated Cap Cap/LED Colors	
AC	Square Black Cap/Red LED
AE	Square Black Cap/Yellow LED
AF	Square Black Cap/Green LED

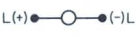
Cap for LED Diffuser/LED Colors	
CC	Red with Red
EE	Yellow with Yellow
FF	Green with Green

Color Codes: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **J** Clear

SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

POLES AND CIRCUITS

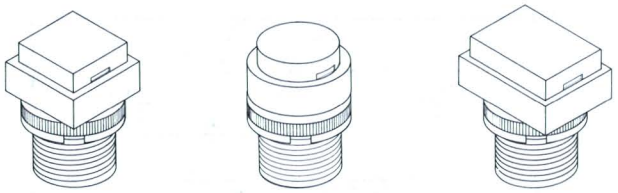
POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary	
		Normal	Down
SPDT	KB15 KB16	ON ON	(ON) ON
CONNECTED TERMINALS		2-3	2-1
SCHEMATICS Power/Lamp			
DPDT	KB25 KB26	ON ON	(ON) ON
CONNECTED TERMINALS		2-3 5-6	2-1 5-4
SCHEMATICS Power/Lamp			

Terminal numbers are not actually on the switch; "+" and "-" are molded on the base. Lamp circuit is isolated and requires an external switch.

SHAPES & MOUNTING TYPES

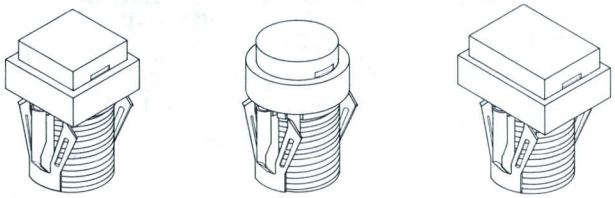
Shroud for Bushing Mounting

S .551" Square **C** .551" Dia. Round **R** .551" x .728" Rectangular



Shroud for Snap-in Mounting

K .551" Square **M** .551" Dia. Round **N** .551" x .728" Rectangular



HOUSING

K Housing available in black only.

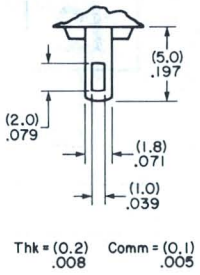
RATING, CONTACT MATERIAL AND TERMINAL TYPES

W01 1A
Power Circuit

Silver Contacts
Solder Lug Terminals

G01 0.4VA
Logic Level Circuit

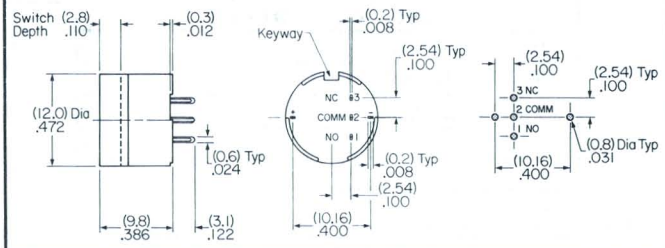
Gold Contacts
Solder Lug Terminals



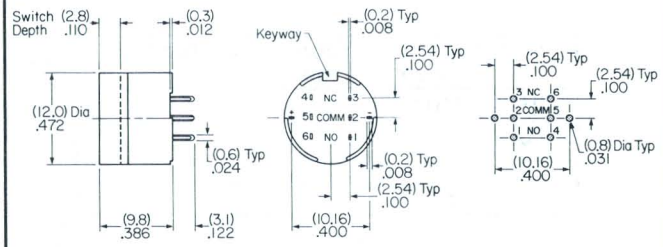
OPTIONAL PCB ADAPTORS

Note: Adaptors are ordered separately.

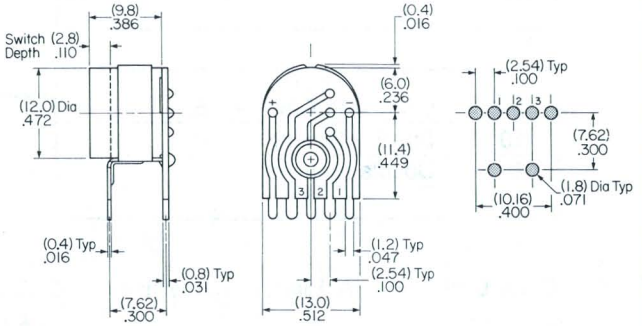
AT701
Single Pole Straight PC Terminals
Glass reinforced polyamide



AT702
Double Pole Straight PC Terminals
Glass reinforced polyamide



AT077
Single Pole Right Angle Terminals
Glass reinforced polyamide



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NKK SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

LAMPS

The electrical specifications shown below are determined at a basic temperature of 25°C. Lamp circuit is independent of switch operation. Dimension drawings of lamps are in the accessories section at the end of this catalog. If the source voltage exceeds the lamp's rated voltage, the required ballast resistor value can be calculated by using the formula at the end of the catalog.

Incandescent Lamp

AT611
Incandescent Lamp

05 5 Volt
12 12 Volt
28 28 Volt

T-1 Standard Bi-pin

Used with Solid Colored, Colored Insert and Spot Illuminated Caps

ELECTRICAL SPECIFICATIONS				
Voltage	V	5V AC	12V AC	28V AC
Current	I	115mA	60mA	24mA
Endurance		7,000 hours average		

Single Element LED

10 **AT614**
Single Element

T-1½ Cylindrical

Used with Cap for LED and Spot Illuminated Cap

ELECTRICAL SPECIFICATIONS				
		Red	Yellow	Green
Forward Peak Current	I_{FM}	50mA	50mA	50mA
Continuous Forward Current	I_F	40mA	40mA	40mA
Forward Voltage	V_F	1.75V	2.35V	2.35V
Reverse Peak Voltage	V_{RM}	4V	4V	4V
Current Reduction Rate Above 25°C	ΔI_F	0.67mA/°C	0.67mA/°C	0.67mA/°C

Neon Lamp

01 **AT615**
Neon Lamp

T-1 Standard Bi-pin

Used with Colored Insert and Spot Illuminated Caps

ELECTRICAL SPECIFICATIONS		
Voltage	V	110V AC
Current	I	1.5mA
Endurance		10,000 hours
Recommended Resistors:		33K ohms for 110V AC 100K ohms for 220V AC

Double Element LED

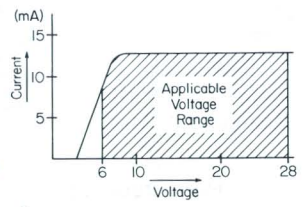
20 **AT612**
Double Element

T-1½ Cylindrical

Used with Cap for LED and Spot Illuminated Cap

ELECTRICAL SPECIFICATIONS				
		Red	Yellow	Green
Forward Peak Current	I_{FM}	20mA	20mA	20mA
Continuous Forward Current	I_F	13mA Average		
Forward Voltage	V_F	6 ~ 28V		
Forward Peak Voltage	V_{FM}	30V	30V	30V
Reverse Peak Voltage	V_{RM}	30V	30V	30V
Current Variable Rate	ΔI_F	V_F = 10 ~ 24V ±20%		

A built-in IC chip maintains constant current when used within a 6–28V range. Voltage surges beyond 28 volts will burn down the IC chip. The IC chip's regulation of voltage eliminates the need for a ballast resistor and results in a low current consumption of 13mA average, as illustrated in the accompanying graph. Double elements in the LED result in brighter intensity.



SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

CAP TYPES & COLOR COMBINATIONS

Color Codes: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **J** Clear

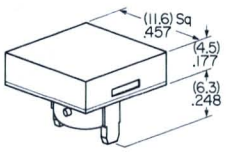
Solid Colored Cap for Incandescent Lamp

Lens/Filter Color Codes:

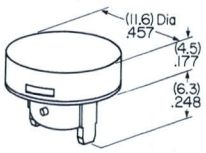
AB	EB
BB	FB
BC	GB
BF	CC
BG	FF
CB	GG

Polycarbonate

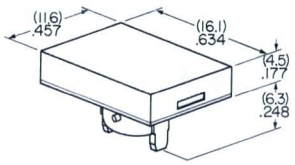
AT485 Square



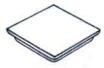
AT486 Round



AT4021 Rectangular



Translucent Colored Lens


Translucent Colored Filter

Lamp (AT611)

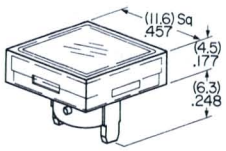
Colored Insert Cap for Incandescent Lamp

Lens/Filter Color Codes:

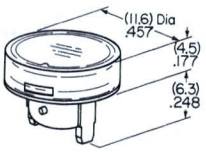
JB
JC
JE
JF
JG

Polycarbonate

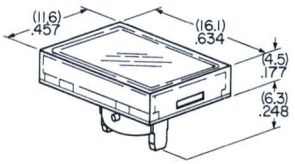
AT487 Square



AT488 Round



AT4022 Rectangular



Transparent Clear Lens

Translucent Colored Filter

Lamp (AT611)

Colored Insert Cap for Neon Lamp

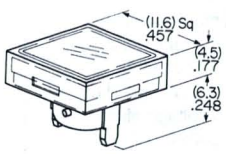
Lens/Filter Color Codes:

JB
JC
JE

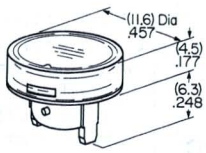
(Contact factory for other combinations.)

Polycarbonate

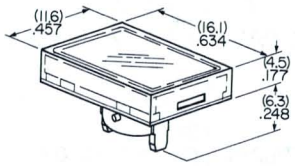
AT487 Square



AT488 Round



AT4022 Rectangular



Transparent Clear Lens

Translucent Colored Filter

Lamp (AT615)

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NKK SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

CAP TYPES & COLOR COMBINATIONS

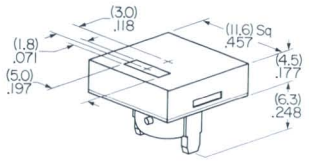
Color Codes: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **J** Clear

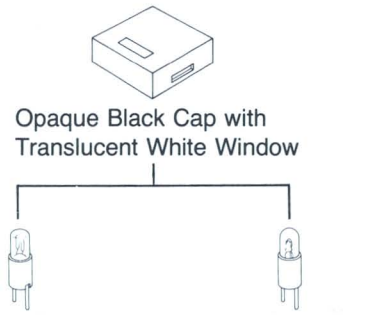
Spot Illuminated Cap for Neon or Incandescent Lamp

Cap Color Code:

AB

AT4051 Square





Polycarbonate

Spot Illuminated Cap for LED

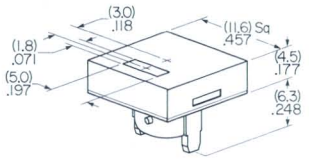
Cap/LED Color Codes:

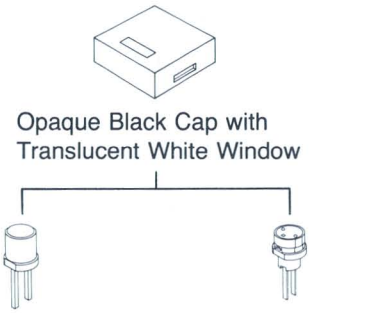
AC

AE

AF

AT4051 Square





Polycarbonate

Cap for LED

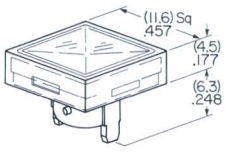
Diffuser/LED Color Codes:

CC

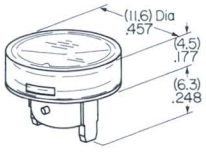
EE

FF

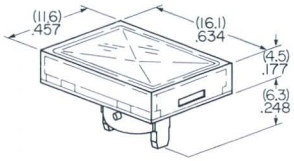
AT489 Square

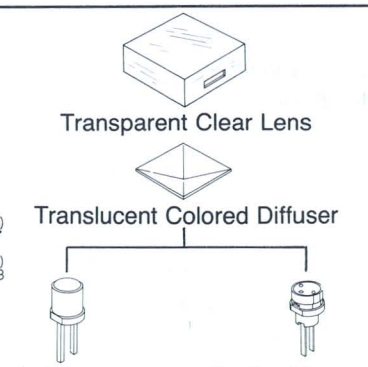


AT490 Round



AT4023 Rectangular





Polycarbonate

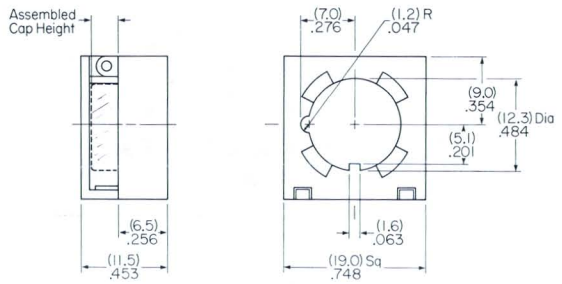
SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

OPTIONAL ACCESSORIES

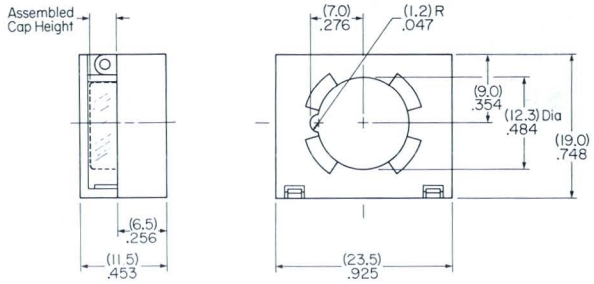
AT494
Protective Guard for Square & Round

Lid: Polycarbonate
Base: Polyamide



AT4024
Protective Guard for Rectangular

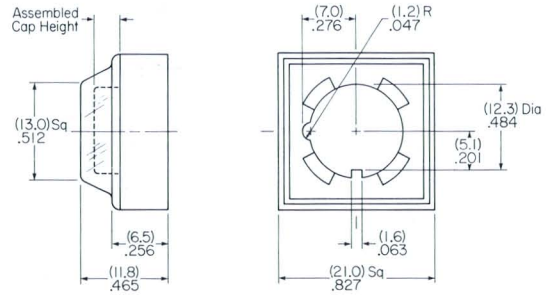
Lid: Polycarbonate
Base: Polyamide



Note: Protective guards reduce the depth of switch behind panel by .047".

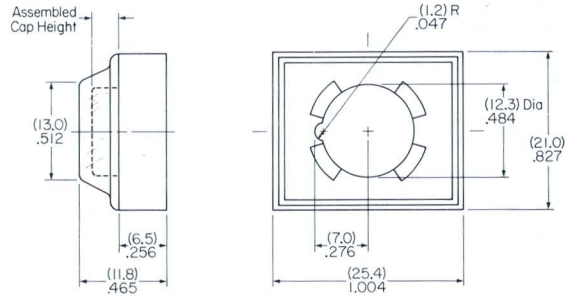
AT495
Splash Cover for Square & Round

Cover: Polyvinyl Chloride
Base: Polyethylene



AT4025
Splash Cover for Rectangular

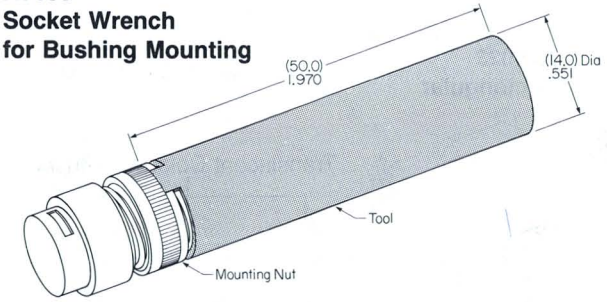
Cover: Polyvinyl Chloride
Base: Polyethylene



Note: Polyvinyl chloride loses pliability below 0°C (32°F). Splash covers reduce the depth of switch behind panel by .047".

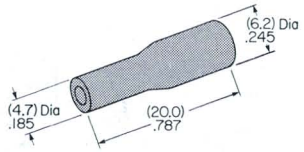
TOOLS

AT108
Socket Wrench
for Bushing Mounting



Overtightening the mounting nut may damage the switch housing.

AT107
Lamp Extractor



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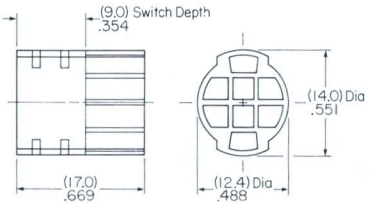
NKK SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

CROSSOVER GUARD

A partitioned plastic guard is supplied with each switch to provide insulation between terminals. Installation of the guard requires the following sequence of steps:



(1) Identify wire-to-terminal connections.

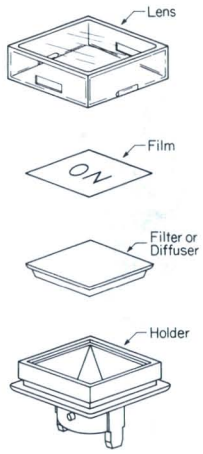
(2) Thread wires through the guard.

(3) Solder the connections.

(4) Push the guard fully onto the switch body.

INSCRIPTIONS

Inscriptions can be placed on the lens, diffuser/filter, or a film inserted between the two. Details regarding hot stamping or engraving can be obtained from the factory.



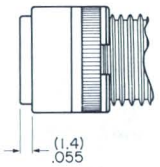
SOLDERING & WIRING

Soldering time for the solder lug and PC is less than three seconds at 350°C or five seconds at 270°C.

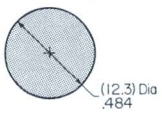
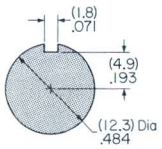
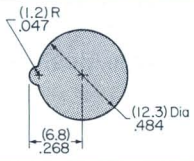
The .039″ × .079″ oblong hole accommodates one solid or stranded 20-gauge wire or two solid or stranded 22-gauge wires.

LATCHDOWN DIMENSION

The cap extends 1.4mm (.055") above the shroud when in the latchdown position.



EFFECTIVE PANEL THICKNESS AND PANEL CUTOUTS

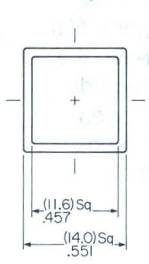
	Bushing Mounting without Keyway	Bushing Mounting with Keyway	Snap-in Mounting
Panel Thickness:	0.5 ~ 8mm (.020 ~ .315″)	0.5 ~ 8mm (.020 ~ .315″)	1.0 ~ 3.5mm (.039 ~ .138″)
Panel Cutout:			

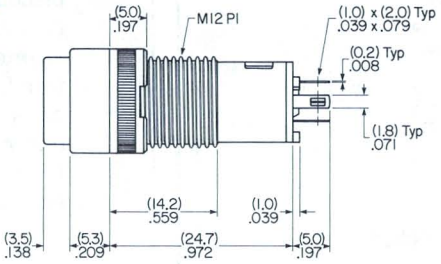
Panel thickness range is 0.5 ~ 6.8mm (.020 ~ .268″) when using the splash cover or protective guard.

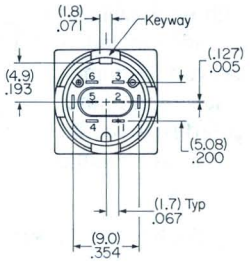
SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

Square/Bushing Mounting/Solder Lug/1-2 Pole



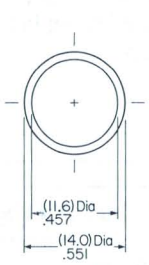


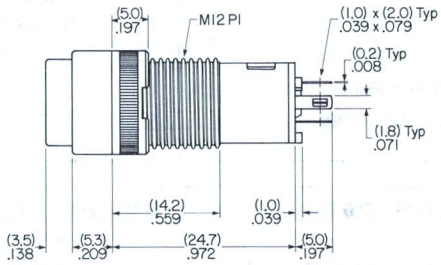


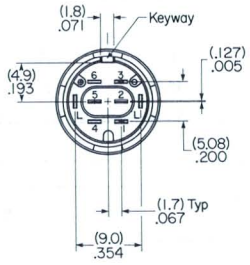
KB15SKW01-05-GG Model Shown

Terminals 4, 5 & 6 are not on single pole models.

Round/Bushing Mounting/Solder Lug/1-2 Pole



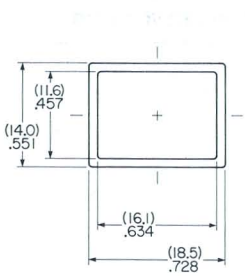


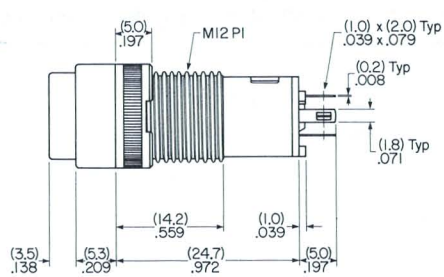


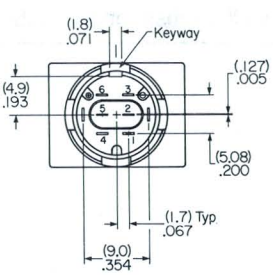
KB25CKW01-05-GG Model Shown

Terminals 4, 5 & 6 are not on single pole models.

Rectangular/Bushing Mounting/Solder Lug/1-2 Pole







KB15RKW01-05-GG Model Shown

Terminals 4, 5 & 6 are not on single pole models.

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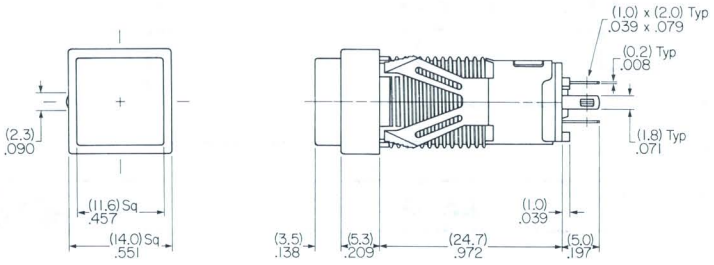
SERIES KB PUSHBUTTON SWITCHES

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

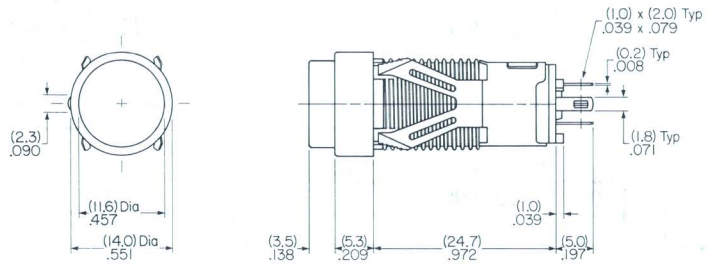
Square/Snap-in Mounting/Solder Lug/1-2 Pole



KB16KKW01-10-FF Model Shown

Terminals 4, 5 & 6 are not on single pole models.

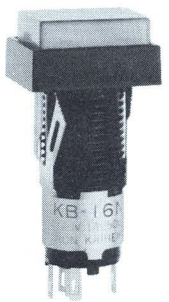
Round/Snap-in Mounting/Solder Lug/1-2 Pole

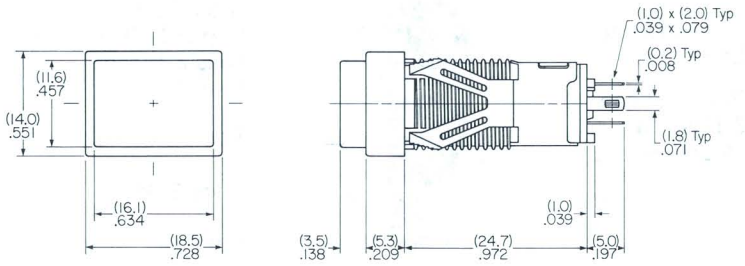


KB26MKW01-10-FF Model Shown

Terminals 4, 5 & 6 are not on single pole models.

Rectangular/Snap-in Mounting/Solder Lug/1-2 Pole





KB16NKW01-10-FF Model Shown

Terminals 4, 5 & 6 are not on single pole models.

SERIES KB INDICATORS

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

TYPICAL INDICATOR ORDERING EXAMPLE

KB 02 K W01 — 12 — GB

SHAPES	
Bushing Mounting	
01	Square
02	Round
03	Rectangular
Snap-in Mounting	
04	Square
05	Round
06	Rectangular

HOUSING	
K	Black only available

TERMINALS	
W01	Silver Solder Lug

LAMPS

Incandescent Lamp used with Solid Cap	
05	5 Volt
12	12 Volt
28	28 Volt

Incandescent Lamp used with Insert Cap	
05	5 Volt
12	12 Volt
28	28 Volt

Neon Lamp used with Insert Cap	
01	110 Volt

LED used with Cap for LED	
10	Single Element
20	Double Element

CAP TYPES & COLOR COMBINATIONS

Solid Cap Lens/Filter Colors			
*BB	BG	*FB	*FF
BC	*CB	*GB	*GG
BF	*EB	*CC	

*Standard Lens/Filter Combinations

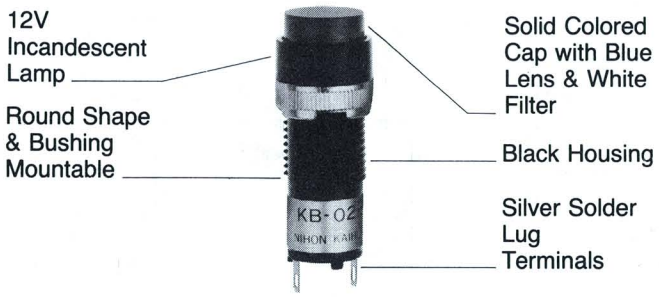
Insert Cap Lens/Filter Colors	
JB	Clear with White
JC	Clear with Red
JE	Clear with Yellow
JF	Clear with Green
JG	Clear with Blue

Insert Cap Lens Filter Colors		
JB	JC	JE
Contact factory for JJ & CC		

Cap for LED Diffuser/LED Colors	
CC	Red with Red
EE	Yellow with Yellow
FF	Green with Green

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (KB02KW01-12-GB):

SERIES KB INDICATOR



Color Codes: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **J** Clear

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NKK SERIES KB INDICATORS

MINIATURE/REAR PANEL & SNAP-IN MOUNTING

SHAPES AND MOUNTING TYPES

Shroud for Bushing Mounting

01 .551″ Square

02 .551″ Dia. Round

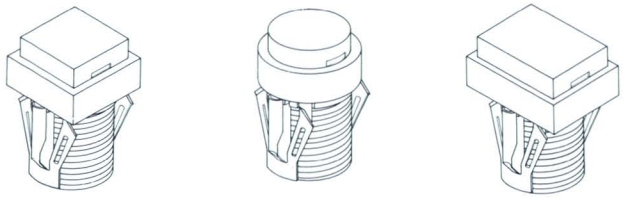
03 .551″ x .728″ Rectangular

Shroud for Snap-in Mounting

04 .551″ Square

05 .551″ Dia. Round

06 .551″ x .728″ Rectangular



Shroud shape determines the shape of cap. The shroud is an integral part of the indicator body which comes in black only.

LAMPS

Electrical specifications for lamps and LEDs are given with the previous KB switch data.

Incandescent

05 AT611 5 Volt

12 AT611 12 Volt

28 AT611 28 Volt

T-1 Standard Bi-pin

Used with Solid Colored and Colored Insert Caps

Neon

01 AT615 110 Volt

T-1 Standard Bi-pin

Used with Colored Insert Cap

LED

10 AT614 Single Element

20 AT612 Double Element

T-1 1/2 Cylindrical

T-1 1/2 Cylindrical

Used with Cap for LED

HOUSING

K Housing available in black only.

TERMINALS

W01 Silver Solder Lug Terminals

CAPS

Cap dimension drawings are given with the previous KB switch data.

Color Codes:

B White **C** Red **E** Yellow **F** Green
G Blue **J** Clear

Solid Colored Cap

Lens/Filter Color Codes:

BB **FB**
BC **GB**
BF **CC**
BG **FF**
CB **GG**
EB

AT485 **AT486** **AT4021**

Polycarbonate

Colored Insert Cap

Lens/Filter Color Codes:

JB **JF**
JC **JG**
JE

AT487 **AT488** **AT4022**

Polycarbonate

Note: JF & JG not available with neon

Cap for LED

Diffuser/LED Color Codes:

CC
EE
FF

AT489 **AT490** **AT4023**

Polycarbonate

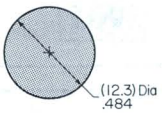
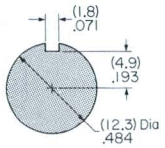
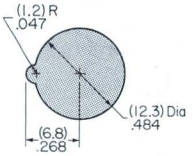
Pushbuttons

Illuminated

SERIES KB INDICATORS

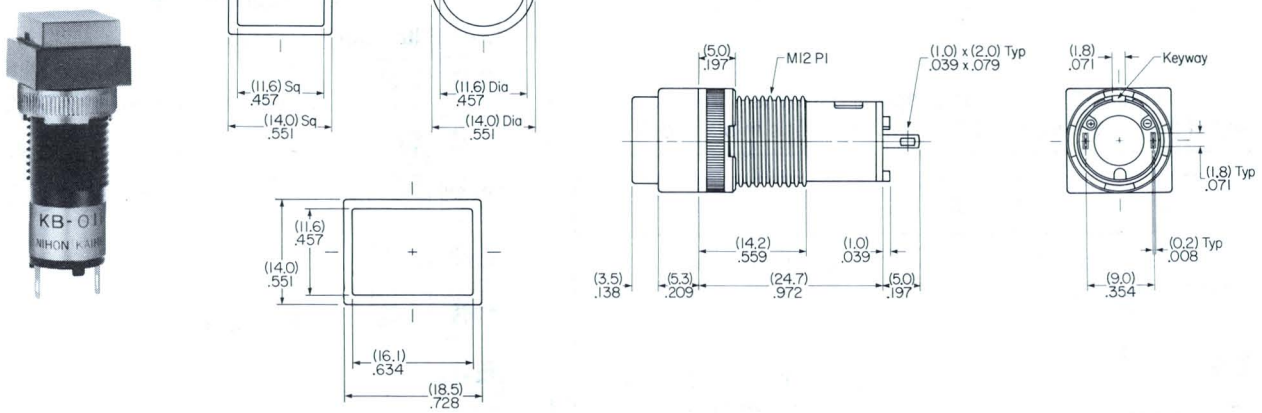
MINIATURE/REAR PANEL & SNAP-IN MOUNTING

EFFECTIVE PANEL THICKNESS & PANEL CUTOUTS

	Bushing Mounting without Keyway	Bushing Mounting with Keyway	Snap-in Mounting
Panel Thickness:	0.5 ~ 8.0mm (.020 ~ .315")	0.5 ~ 8.0mm (.020 ~ .315")	1.0 ~ 3.5mm (.039 ~ .138")
Panel Cutouts:			

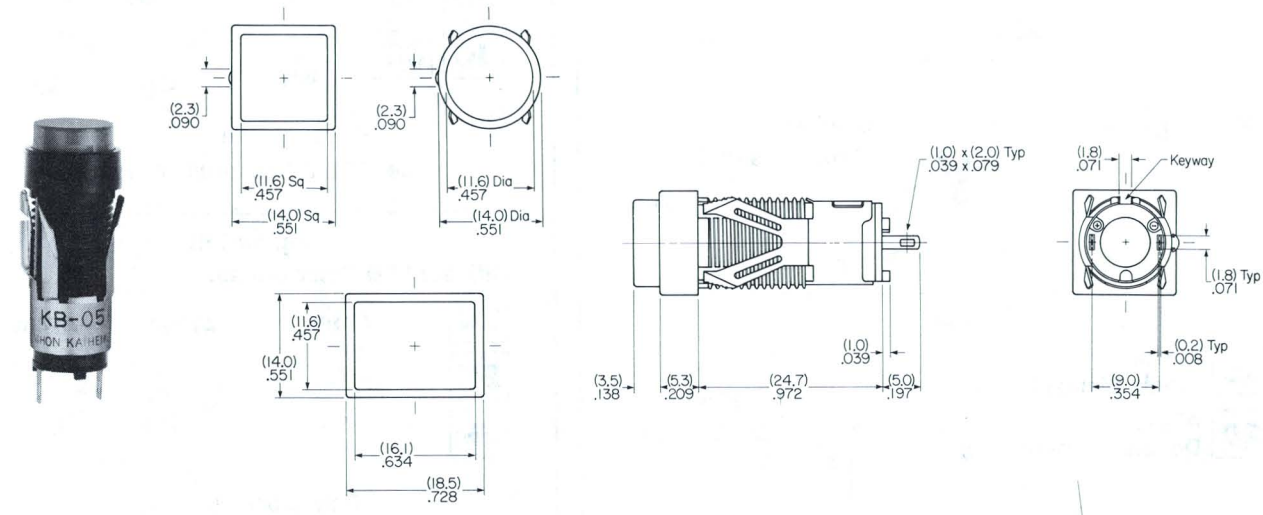
Panel thickness range is 0.5 ~ 6.8mm (.020 ~ .268") when using the splash cover.

Bushing Mounting/Solder Lug Terminals



KB01KW01-05-GG Model Shown

Snap-in Mounting/Solder Lug Terminals



KB05KW01-05-FF Model Shown

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NKK SERIES YB

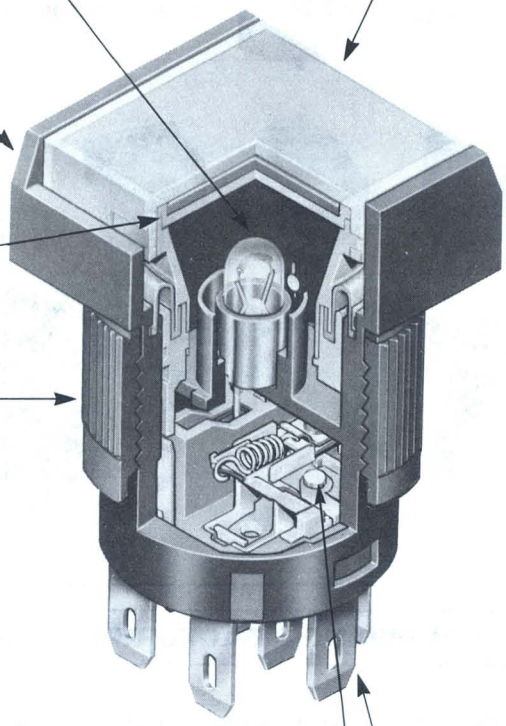
SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

DISTINCTIVE FEATURES

Bright, full face or spot illumination with incandescent lamps or multi-element LEDs, with or without resistors.

Front panel relamping.

Combination bezel-barrier is an integral part of the switch and prevents accidental actuation.



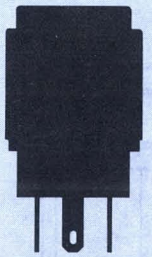
Unique, patented seal inside caps for added protection to interior mechanism.

Dust and oil tight as well as splashproof. Panel seal models qualify to IP65 of IEC529 Standards (similar to NEMA 4 and 13).

High density design to give behind panel depth of less than one inch.

Momentary and alternate action circuits available in the same space-saving body size.

Actual Size



Distinctive design of snap-action contacts for shock resistance, long life, and sensitive actuation.

Latchdown for indication of circuit status, plus audible, tactile feedback with smooth, responsive operation.

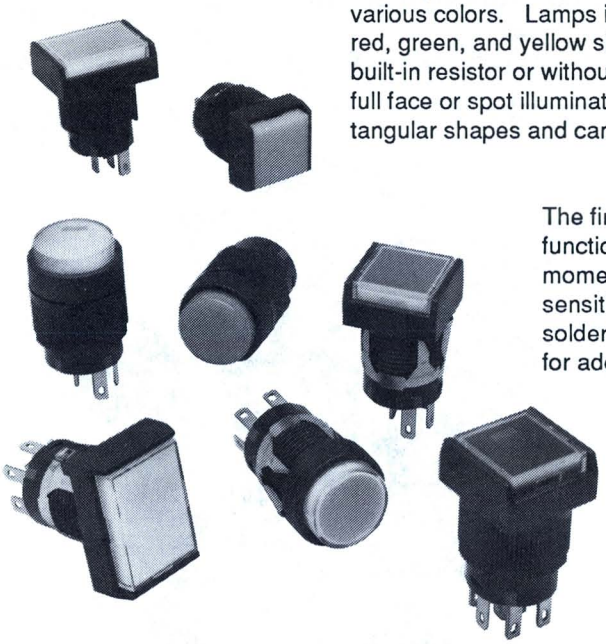
Tin-lead plated terminals are epoxy sealed to lock out flux, dust, solvents, and other contaminants.

NKK SERIES YB PUSHBUTTON SWITCHES

SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

APPLICATIONS

YB Series is constructed for quality performance, giving the user assurance of reliable functioning and long life. Components are factory assembled, which greatly simplifies ordering and field installation. In fact, the only complicated thing about YB is choosing which of the expansive number of combinations to use.



These pushbuttons have a built-in bezel-barrier and choice of four cap styles of various colors. Lamps include incandescent 5, 12, and 28-volt as well as LEDs in red, green, and yellow single color, plus red/green bicolor. LEDs are available with built-in resistor or without. Lamp displays can be single color or bicolor with bright, full face or spot illumination. All cap styles are available in square, round, and rectangular shapes and can accommodate inscriptions.

The fine appearance of YB switches is joined with a broad array of functional characteristics: panel sealed or nonsealed versions, momentary and alternate action circuits, snap-acting contacts and sensitive operation, bushing or snap-in mounting, tin-lead plated solder lug/.110" quick connect terminals, plus a seal in the caps for additional protection from intruding liquids.

Compact size, aesthetic design, and safety barriers make YB Series ideal for creating control panels that are attractive and suited to numerous settings. The YB Series is suited to such applications as test instruments, monitoring equipment, process controllers, and computer peripherals.

EASY ORDERING & FACTORY ASSEMBLY

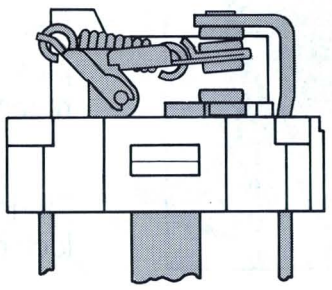
NKK's simple, straightforward ordering system helps you easily order a totally assembled YB switch or single components. No need to search in circles from one footnote to another. No need to wonder if you have built the right part number for a complete device. No hassle at all with NKK's ordering.

The YB ordering number is uncomplicated and includes all features needed to specify the desired switch. Circuitry, panel seal, mounting type, contact material, terminals, lamp type and color, cap style and color -- all are included in the ordering codes used to build a single part number for a YB switch.

A YB pushbutton includes caps, lamps, and mounting nut or snap-in frame. The combination bezel-barrier is an integral part of the switch. Replacement caps and lamps can also be ordered without any complications with part numbers.

SNAP-ACTING MECHANISM

The snap-acting contact mechanism in the YB pushbutton provides long electrical life and pronounced sensitivity, along with patented shock resistent design. The contact mechanism is double throw with a normally closed and normally open contact. Tactile feedback is transmitted to the cap from an independent latchdown mechanism.



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NKK SERIES YB PUSHBUTTON SWITCHES

SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	3A @ 125/250V AC & 3A @ 30V DC for silver 0.4VA maximum @ 28V AC/DC maximum for gold (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	50 milliohms maximum for silver 100 milliohms maximum for gold
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	1,000,000 operations minimum for momentary action 200,000 operations minimum for alternate action
Electrical Life:	100,000 operations minimum
Pretravel:	1.5mm (.059")
Overtravel:	1.5mm (.059")
Total Travel:	3.0mm (.118")
Ambient Temp Range:	Illuminated: -15°C through +50°C (+5°F through +122°F) Nonilluminated: -15°C through +70°C (+5°F through +158°F)

Nominal Operating Force:

	Nonsealed	Sealed
Single pole	150 grams	170 grams
Double pole	280 grams	300 grams

MATERIALS & FINISHES

Housing/Bezel	Glass fiber reinforced polyamide
Snap-in Frame	Stainless steel
Movable Contactor	Silver alloy or copper with gold plating over nickel
Movable Contact	Silver alloy or copper with gold plating over nickel
Stationary Contacts	Silver alloy or copper with gold plating over nickel
Power Terminals	Phosphor bronze with tin-lead plating
Lamp Terminals	Phosphor bronze with tin-lead plating
Base	Diallylphthalate resin

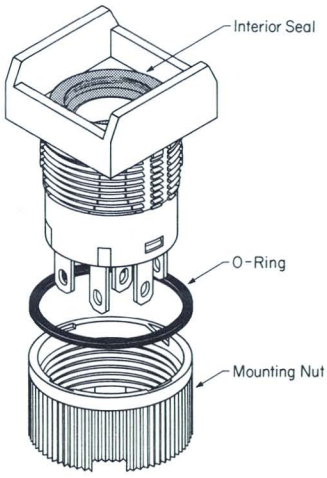
PANEL SEAL CONSTRUCTION

The YB panel seal device includes three rubber seals that protect the contact mechanism from oil, dust, water, and other contaminants which could otherwise enter from the front panel.

The interior seal is a rolled sleeve of nitrile butadiene rubber covering the joining of the housing and the inner case.

The exterior nitrile butadiene rubber o-ring (AT089 provided w/panel seal model) is positioned between the built-in bezel and the panel when the switch is mounted.

A seal of thermoplastic elastomer inside the caps further protects the interior.



NKK SERIES YB PUSHBUTTON SWITCHES

SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

TYPICAL SWITCH ORDERING EXAMPLE

YB	1	5		C	K	W01

POLES

1	SPDT
2	DPDT

CIRCUITS

5	ON	(ON)
6	ON	ON
( ) = momentary		

MOUNTING & SHAPES

Bushing Mounting	
S	Square
C	Round
R	Rectangular
Snap-in Mounting	
K	Square
M	Round
N	Rectangular

PANEL SEAL

No Code	Without Panel Seal
W	With Panel Seal (Bushing Mount Only)

HOUSING

K	Black

CONTACTS & TERMINALS

W01	Silver Contacts & Solder Lug/ Quick Connect Terminals
G01	Gold Contacts & Solder Lug/ Quick Connect Terminals

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (YB15CKW01-04F-JF):

SERIES YB PUSHBUTTON

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AND ASSEMBLY ORDERING EXAMPLE

— **04F** — **JF**

Select only allowable lamp/cap combinations by choosing 1 of the 4 arrowed categories.

LAMPS

Incandescent Lamp	
05	5-volt
12	12-volt
28	28-volt
00	Nonilluminated

CAP TYPES & COLORS

Solid Cap for Incandescent	
B	White
C	Red
E	Yellow
F	Green
G	Blue

LED & Cap for Spot Illumination						
Forward Voltage		LED Color		LED & Cap are one unit	Cap Color	
02	2-volt *	C	Red		A	Black
05	5-volt	E	Yellow		B	White
12	12-volt	F	Green		C	Red
24	24-volt	CF	Red/Green		E	Yellow
* 2-volt LED has no resistor.					F	Green

Single Color LED			
Forward Voltage		LED Color	
04	4-volt	C	Red
		E	Yellow
		F	Green

LED Cap for Single Color	
JB	Clear Lens/White Filter
JC	Clear Lens/Red Filter
JE	Clear Lens/Yellow Filter
JF	Clear Lens/Green Filter

Bicolor LED for Full Face Illumination			
Forward Voltage		LED Color	
02	2-volt *	CF	Red/Green
05	5-volt		
12	12-volt		
24	24-volt		
* 2-volt LED has no resistor.			

LED Cap for Bicolor	
JB	Clear Lens with White Filter

NKK SERIES YB PUSHBUTTON SWITCHES

SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

POLES & CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary — Normal	Down
SPDT	YB15 YB16	ON ON	(ON) ON
CONNECTED TERMINALS		1-3	1-2
SCHEMATICS Switch/Lamp		Lamp circuit is isolated & requires an external switch.	
DPDT	YB25 YB26	ON ON	(ON) ON
CONNECTED TERMINALS		1-3 4-6	1-2 4-5
SCHEMATICS Switch/Lamp		Lamp circuit is isolated & requires an external switch.	

Terminal numbers are not actually on switch.

LATCHDOWN DIMENSION

The latchdown feature on alternate action circuits provides visible, audible, and tactile feedback. Smooth and responsive operation is achieved with the design of this mechanism.

From normal position to latchdown position is 2.5mm (.098").

Normal Position — Latchdown Position

PANEL SEAL

No Code Without Panel Seal

Bushing Mounting

Supplied with mounting nut.

Snap-in Mounting

W With Panel Seal

Bushing Mounting

Supplied with mounting nut & o-ring.

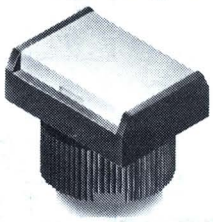
MOUNTING TYPES & SHAPES

Bushing Mounting

S Square

C Round

R Rectangular



Snap-in Mounting

K Square

M Round

N Rectangular

HOUSING

K Black

The 1-piece body and bezel-barrier have a black matte finish.

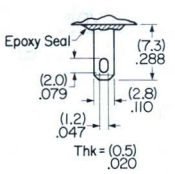
CONTACTS & TERMINALS

W01

Silver Contacts & Tin-lead plated Solder Lug/.110" QC Terminals

G01

Gold Contacts & Tin-lead plated Solder Lug/.110" QC Terminals



Typical mating connector
AMP
#42068-1 (reel)
#42470-1
(loose piece)

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NKK SERIES YB PUSHBUTTON SWITCHES

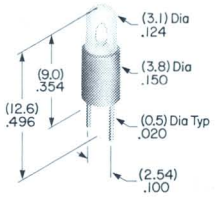
SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

INCANDESCENT LAMP

AT611 Used with Solid Cap

Lamp Codes

- **05** 5-volt
- **12** 12-volt
- **28** 28-volt
- **00** No Lamp



T-1 Standard Bi-pin

Example of Part Number when Ordered Separately:
AT611-28V for 28-volt lamp

Specifications

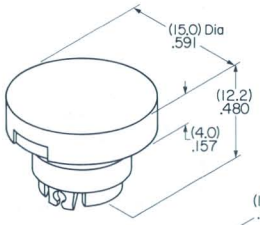
Lamp Codes		05	12	28
Voltage	V	5V	12V	28V
Current	I	115mA	60mA	24mA
MSCP		.150	.150	.150
Endurance	Hours	7,000	7,000	7,000
Ambient Temp Range		-15°C ~ +50°C		

SOLID CAP FOR INCANDESCENT LAMP

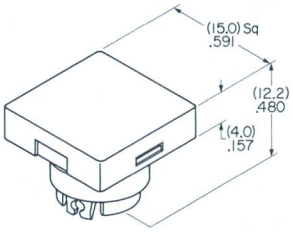
Color Codes

- **B** White
- **C** Red
- **E** Yellow
- **F** Green
- **G** Blue

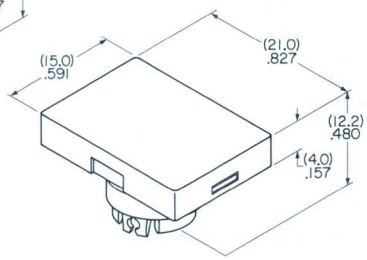
AT3002 Round



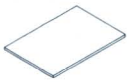
AT3001 Square



AT3003 Rectangle



Translucent Colored Lens



Translucent White Filter

Translucent White Seal

Incandescent Lamp
AT611

Cap Materials: Polycarbonate Lens & Filter with Thermoplastic Elastomer Seal
Example of Part Number when Ordered Separately: **AT3001-G** for square blue cap.

COMPONENT ORDERING WITH "AT" NUMBERS

Lamps & caps can be ordered separately from the switch. Part numbers preceded by "AT" are used for this purpose. The following examples illustrate the difference between ordering a complete switch assembly or a lamp or cap replacement.

Assembled Switch Part Number	Separate Component Part Number	Description of Component
YB15KSKW01-*12-C*	AT611-*12V* AT3001-*C*	12-volt incandescent lamp Square, red solid cap
YB15CKW01-*04E-JE*	AT620E-*04* AT3005*JE*	Yellow, 4-volt LED Round LED cap with yellow diffuser
YB15RKW01-*02CFA*	AT3012*ACF-02*	Rectangular, black spot illuminated cap with red/green, 2-volt bicolor LED
YB15SKW01-*05CF-JB*	AT621*CF-05* AT3004*JB*	Red/green, 5-volt bicolor LED Square LED cap with white diffuser

NKK SERIES YB PUSHBUTTON SWITCHES

SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

SPOT ILLUMINATED CAP WITH BUILT-IN LED

This spot-illuminated cap is a 1-piece assembly. The parts -- LED & cap -- are not available separately. Choose voltage, LED color, & insert color in any desired combination. Make selections using the 3 steps below.

Step 1: LED Voltage Codes

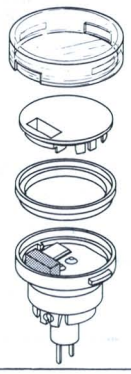
02	2-volt w/o Resistor
05	5-volt w/built-in Resistor
12	12-volt w/built-in Resistor
24	24-volt w/built-in Resistor

Step 2: LED Color Codes

C	Red
E	Yellow
F	Green
CF	Red/Green

Step 3: Insert Color Codes

A	Black
B	White
C	Red
E	Yellow
F	Green

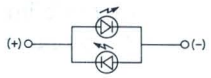
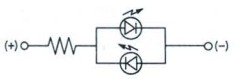


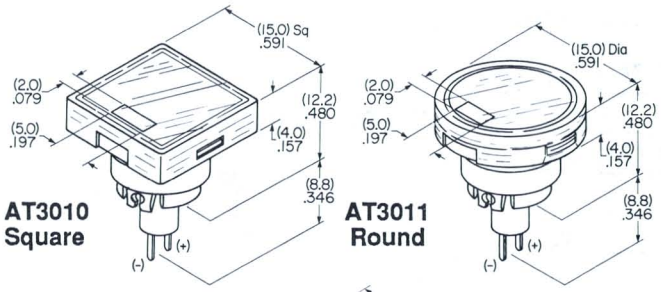
Specifications

LED Voltage Codes		02 w/o Resistor	05 with Resistor	12 with Resistor	24
Forward Peak Current	I_{FM}	20	15	15	12mA
Continuous Fwd Current	I_F	15	12.5	12.5	10mA
Forward Voltage	V_F	2.1	5	12	24V
Reverse Peak Voltage	V_{RM}	5	5	5	5V
(Reverse peak voltage not applicable to bicolor.)					
Current Reduction Rate Above 25°C	ΔI_F	0.27 mA/°C	-----	-----	-----
Ambient Temperature Range		-15°C ~ +50°C			

If the source voltage exceeds rated voltage, a ballast resistor is required; this resistor value can be calculated by using formula in Supplement at the end of this catalog.

Schematics

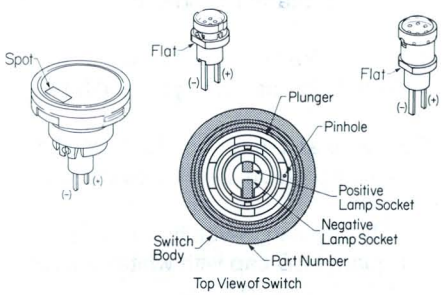
	Without Resistor 2-volt	With Resistor 5, 12, & 24-volt
Single Color		
Bicolor		



Materials: Polycarbonate with Thermoplastic Elastomer Seal

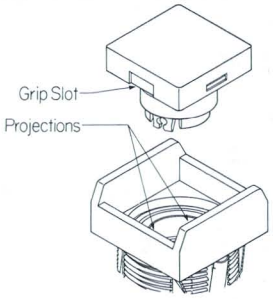
Example Part Number when Ordered Separately:
AT3010AF-02 for black cap with green 2-volt LED

LED ORIENTATION & CAP REPLACEMENT



LED Orientation

Terminals are identified on drawings.
Negative LED terminal is on side with flat or on side with spot.
Negative side of socket is on same side as the part number.



Cap Replacement

Match prongs on base with projections in switch.

Prongs are on same side as the grip slots.

Press firmly in place.

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NKK SERIES YB PUSHBUTTON SWITCHES

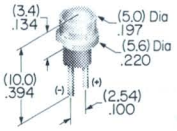
SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

SINGLE COLOR LED

AT620 Single Color LED used for Full Face Illumination

LED Voltage Code

04 4-volt w/o Resistor



LED Color Codes

C	Red
E	Yellow
F	Green

Example of Part Number when Ordered Separately: **AT620C** for red 4-volt LED.

Specifications

LED Color Codes		C	E	F
Forward Peak Current	I_{FM}	40mA	40mA	40mA
Continuous Fwd Current	I_F	30mA	30mA	30mA
Forward Voltage	V_F	3.9V	3.9V	4.2V
Reverse Peak Voltage	V_{RM}	8V	8V	8V
Current Reduction Rate	ΔI_F	0.50	0.50	0.50
Above 25°C		mA/°C	mA/°C	mA/°C
Ambient Temp Range		-15°C ~ +50°C		

BICOLOR LED

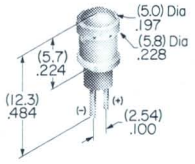
AT621 Bicolor LED used for Full Face Illumination

LED Voltage Codes

02	2-volt w/o Resistor
05	5-volt w/built-in Resistor
12	12-volt w/built-in Resistor
24	24-volt w/built-in Resistor

LED Color Code

CF Red/Green



Specifications

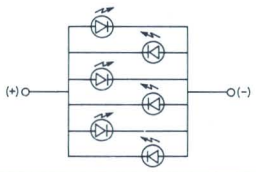
LED Voltage Codes		02	05	12	24
Forward Peak Current	I_{FM}	60	60	20	12mA
Continuous Fwd Current	I_F	45	45	15	10mA
Forward Voltage	V_F	2.1	5	12	24V
Reverse Peak Voltage	V_{RM}	Not applicable to bicolor			
Current Reduction Rate	ΔI_F	0.8	-----	-----	-----
Above 25°C		mA/°C			
Ambient Temp Range		-15°C ~ +50°C			

If the source voltage exceeds rated voltage, a ballast resistor is required; this resistor value can be calculated by using the formula in the Supplement at the end of this catalog.

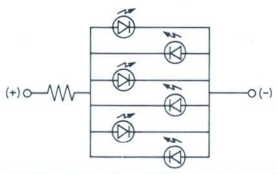
Schematics for Single & Bicolor LEDs

AT620 Single Color LED with 4 Elements 4-volt w/o Resistor

AT621 Bicolor LED with 6 Elements 2-volt w/o Resistor



AT621 Bicolor LED with 6 Elements 5-volt with Resistor



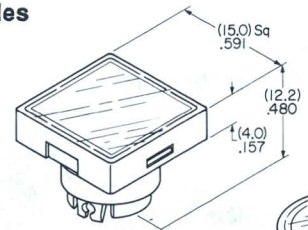
AT621 Bicolor LED with 6 Elements 12 & 24-volt w/Resistor

LED CAP FOR SINGLE OR BICOLOR FULL FACE ILLUMINATION

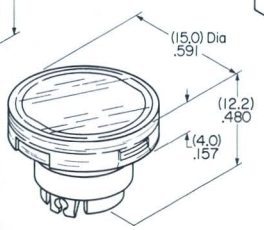
Lens/Filter Color Codes

JB	Clear/White for AT620 or AT621
JC	Clear/Red for AT620
JE	Clear/Yellow for AT620
JF	Clear/Green for AT620

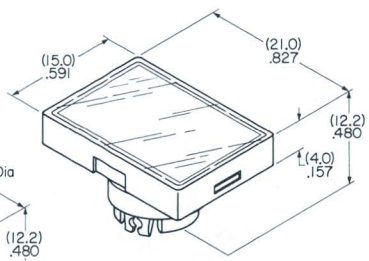
AT3004 Square

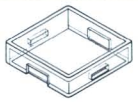


AT3005 Round



AT3006 Rectangle





Transparent Clear Lens

Translucent Colored Filter

Translucent White Seal

Single or Bicolor LED AT620 or AT621

Cap Materials: Polycarbonate Lens & Filter with Thermoplastic Elastomer Seal
Example of Part Number to Order Separately: **AT3005JC** for round, red cap.

NKK SERIES YB PUSHBUTTON SWITCHES

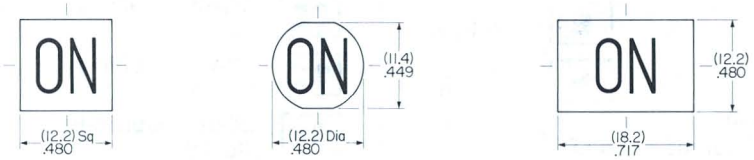
SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

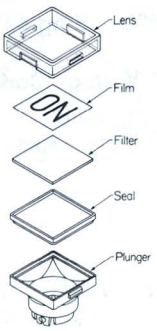
INSCRIPTIONS

Several legending methods are available: pad printing, hot stamping, engraving, and film insertion.

- Pad printing is a preferred method for its long life and is done on the lens or the filter.
- Engraving is limited to a depth of 3.0mm (.021") or less and requires enamel paint for coloring.
- Film inserted between the lens and filter should be adhesive to stay in place on the filter and can have a maximum thickness of 0.1mm (.004").

Contact factory for further details about legending.

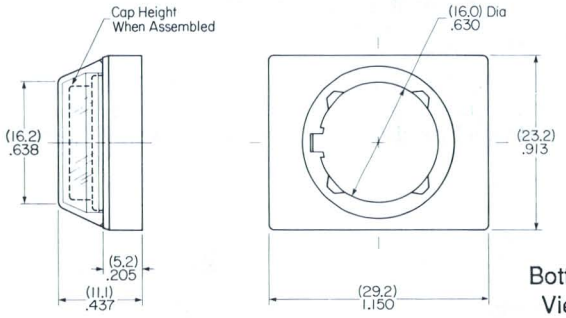




OPTIONAL ACCESSORIES

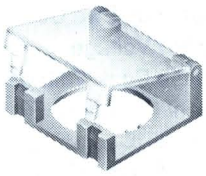
AT4115 Splash Cover for Square, Round, & Rectangular

Lid: Polyvinyl Chloride
Base: Polyamide
Achieves splashproof on bushing mount model w/o o-ring AT541; achieves splashproof & panel seal if combined with o-ring AT541.

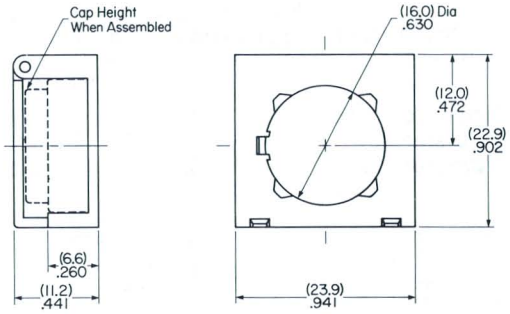


Bottom View

AT4072 Protective Guard for Square, Round, & Rectangular



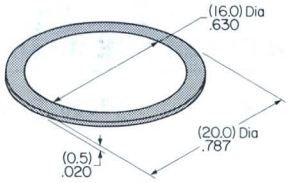
Lid: Polycarbonate
Base: Glass Fiber Reinforced Polycarbonate



Bottom View

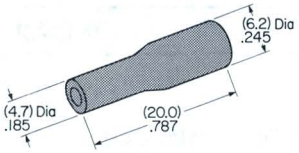
AT541 O-ring for Panel Seal with Splash Cover

Nitrile butadiene rubber



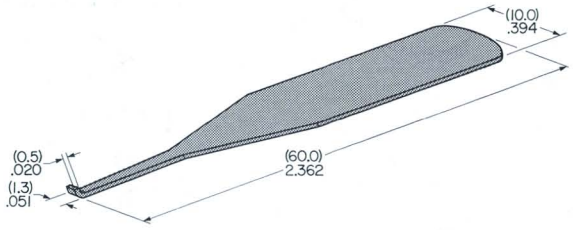
AT107 Lamp Extractor

Polyvinyl chloride



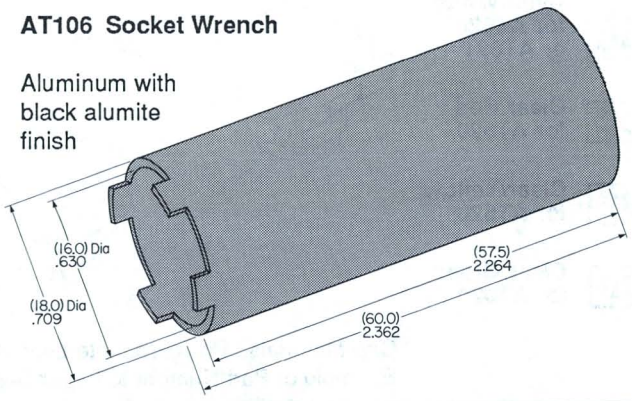
AT105 Cap Removal Tool

Stainless steel



AT106 Socket Wrench

Aluminum with black alumite finish



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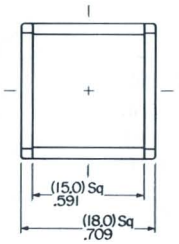
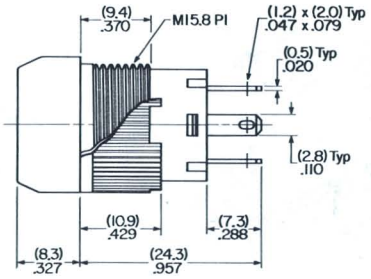
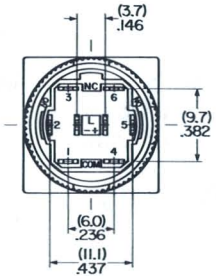
SERIES YB PUSHBUTTON SWITCHES

SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

Square/Bushing Mount/Single & Double Pole



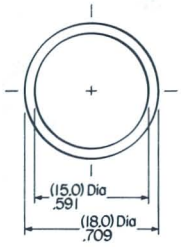


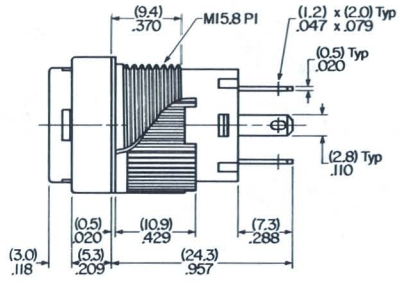


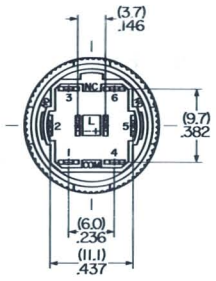
YB15SKW01-28-C Model Shown

Single pole models do not have terminals 4, 5, & 6.

Round/Panel Seal/Single & Double Pole



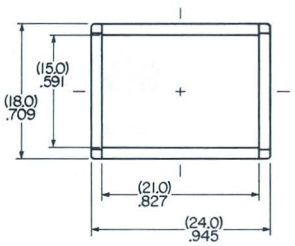


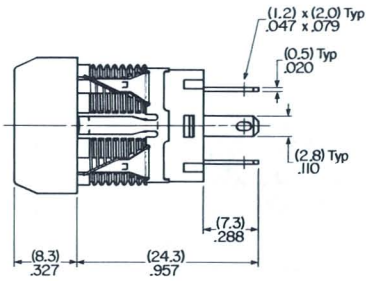


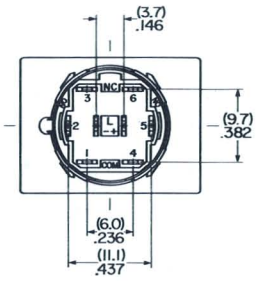
YB25WCKW01-12-E Model Shown

Single pole models do not have terminals 4, 5, & 6.

Rectangular/Snap-in Mount/Single & Double Pole







YB15NKW01-04C-JC Model Shown

Single pole models do not have terminals 4, 5, & 6.

MOUNTING SPECIFICATIONS

Soldering Time & Temperature Limits
3 seconds at 350°C & 5 seconds at 270°C

Maximum Mounting Force: 8kg/cm

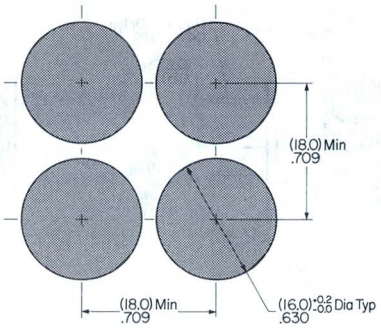
Wiring Specifications
Solder lug terminal hole is .047" X .079" & accommodates one solid 18-gauge wire or two solid or stranded 20-gauge wires.

NKK SERIES YB PUSHBUTTON SWITCHES

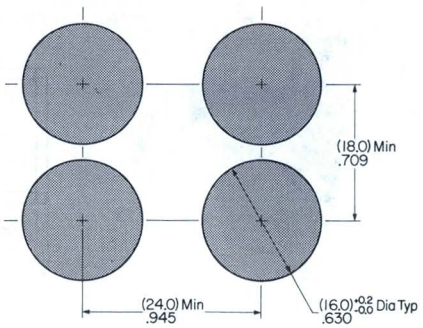
SHORT BODY/SNAP ACTION/BUSHING & SNAP-IN MOUNT

MAX EFFECTIVE PANEL THICKNESS & CUTOUTS FOR SINGLE OR MULTIPLE MOUNTING

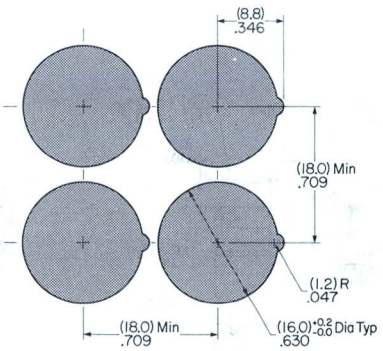
Bushing & Panel Seal Mount for Square or Round
0.5mm ~ 5.0mm
(.020" ~ .197")



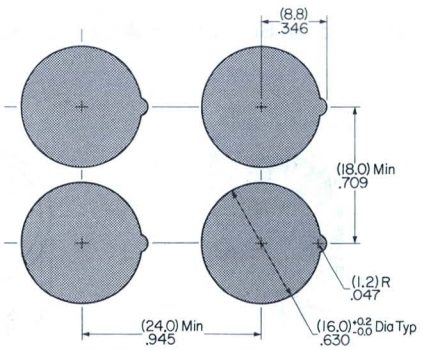
Bushing & Panel Seal Mount for Rectangular
0.5mm ~ 5.0mm
(.020" ~ .197")



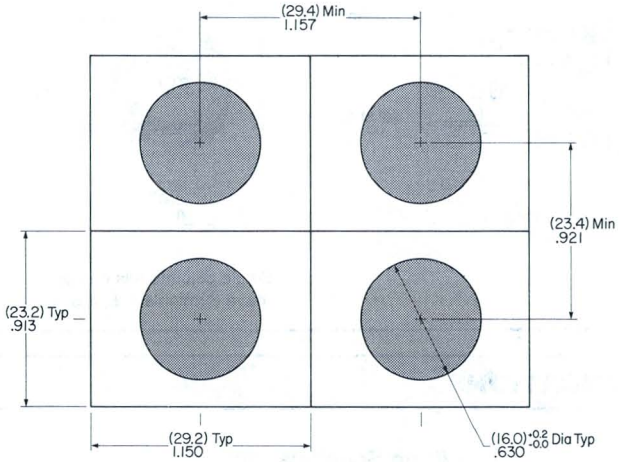
Snap-in Mount for Square or Round
1.0mm ~ 3.5mm
(.039" ~ .138")



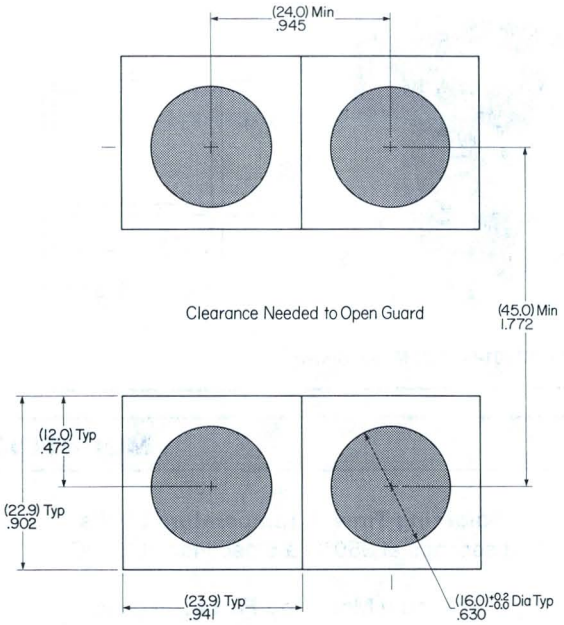
Snap-in Mount for Rectangular
1.0mm ~ 3.5mm
(.039" ~ .138")



With Splash Cover
0.5mm ~ 3.8mm (.020" ~ .150") for Bushing & Panel Seal
0.5mm ~ 2.3mm (.020" ~ .091") for Snap-in



With Protective Guard
0.5mm ~ 3.8mm (.020" ~ .150") for Bushing & Panel Seal
0.5mm ~ 2.3mm (.020" ~ .091") for Snap-in



Pushbuttons

Illuminated

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SERIES YB INDICATORS

SHORT BODY/BUSHING & SNAP-IN MOUNT

TYPICAL INDICATOR ORDERING EXAMPLE

YB | 04 | ☐ | K | W01 | — | 28 | F

MOUNTING & SHAPES

Bushing Mounting	
01	Square
02	Round
03	Rectangular
Snap-in Mounting	
04	Square
05	Round
06	Rectangular

PANEL SEAL

No Code	Without Panel Seal
W	With Panel Seal (bushing mount only)

HOUSING

K	Black

TERMINALS

W01	Silver Solder Lug/ Quick Connect Terminals

LAMPS

Incandescent Lamp	
05	5-volt
12	12-volt
28	28-volt

CAP COLORS

Solid Cap for Incandescent	
B	White
C	Red
E	Yellow
F	Green
G	Blue

LED & Cap for Spot Illumination

Forward Voltage		LED Color		LED & Cap are one unit	Cap Color	
02	2-volt *	C	Red		A	Black
05	5-volt	E	Yellow		B	White
12	12-volt	F	Green		C	Red
24	24-volt	CF	Red/Green		E	Yellow
* 2-volt LED has no resistor.					F	Green

Single Color LED

Forward Voltage		Color	
04	4-volt	C	Red
		E	Yellow
		F	Green

LED Cap for Single Color

JB	White
JC	Red
JE	Yellow
JF	Green

Bicolor LED/Full Face Illum.

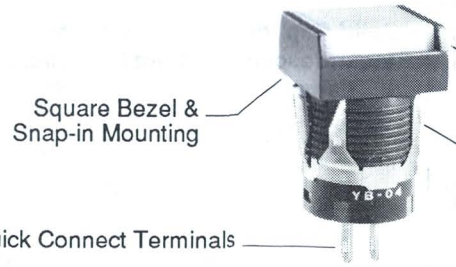
Fwd Voltage		Color	
02	2-volt	CF	Red/Green
05	5-volt		
12	12-volt		
24	24-volt		

LED Cap for Bicolor

JB	Clear Lens with White Diffuser

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (YB04KW01-28F):

SERIES YB INDICATOR



NKK SERIES YB INDICATORS

SHORT BODY/BUSHING & SNAP-IN MOUNT

BEZEL & CAP SHAPES

Bushing Mounting

01 Square

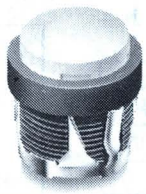
02 Round

03 Rectangular

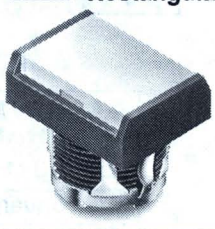
Snap-in Mounting

04 Square

05 Round



06 Rectangular

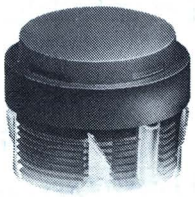


MOUNTING TYPES

No Code Without Panel Seal

Bushing Mounting

Snap-in Mounting



W With Panel Seal

Bushing Mounting

HOUSING

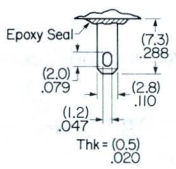
K Black

The 1-piece body and bezel-barrier have a black matte finish.

TERMINALS

W01 Tin-lead plated Solder Lug/ .110" Quick Connect Terminals

Typical mating connector
AMP #42068-1 (reel)
#42470-1 (loose piece)



LAMPS

AT611 Incandescent Lamp

05	5-volt	**28**	28-volt
12	12-volt	**00**	Nonilluminated

AT621 Red/Green LED

02	2-volt	**12**	12-volt
05	5-volt	**24**	24-volt

LED for Spot Illumination

02	2-volt	**C**	Red
05	5-volt	**E**	Yellow
12	12-volt	**F**	Green
24	24-volt	**CF**	Red/Green

AT620 Single Color LED

04C	4-volt Red
04E	4-volt Yellow
04F	4-volt Green

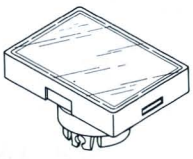
Lamp specifications shown on pages T41-T43.

CAPS

Solid Cap for Incandescent Lamp

Cap for Spot Illumination

LED Cap for Single Color



LED Cap for Bicolor

Caps described in detail on pages T41-T43.

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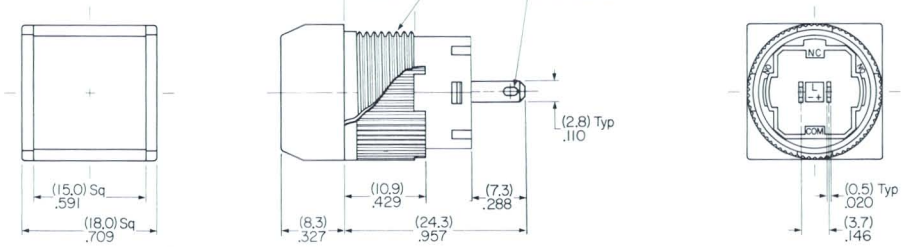
SERIES YB INDICATORS

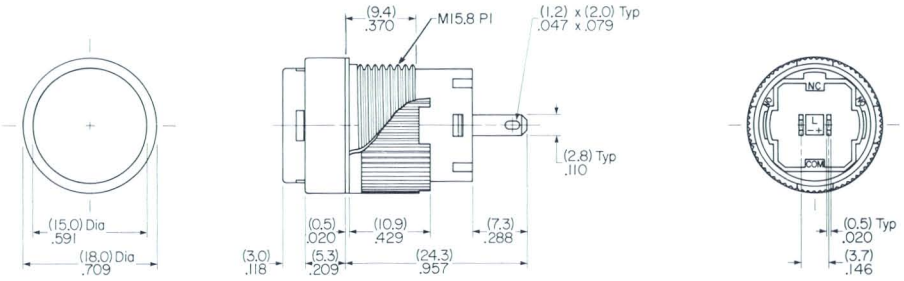
SHORT BODY/BUSHING & SNAP-IN MOUNT

Indicator/Square/Bushing Mount



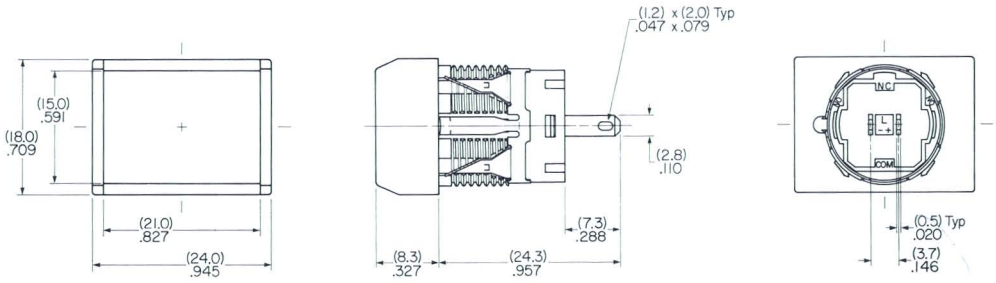
YB01KW01-28-C Model Shown

Indicator/Round/Panel Seal



YB02WKW01-28-C Model Shown

Indicator/Rectangular/Snap-in Mount



YB06KW01-28-C Model Shown

NOTES

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NKK SERIES LB

STANDARD SIZE/SNAP-IN & REAR PANEL MOUNTING

DISTINCTIVE FEATURES

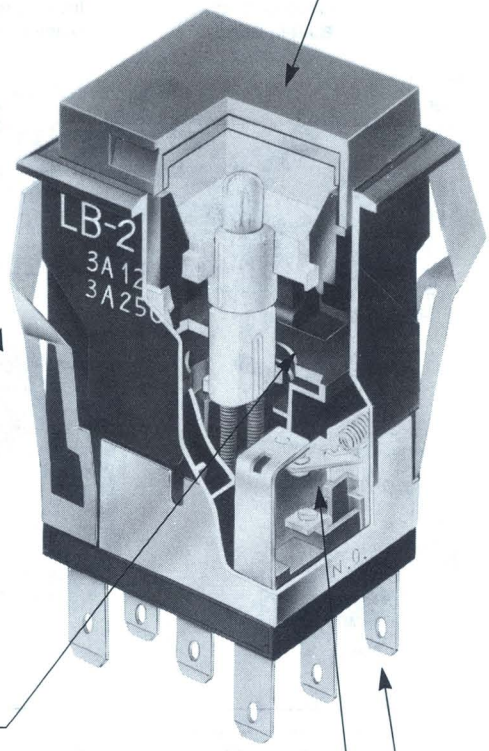
Carefully designed light diffusion and filtering system produces bright, full surface illumination.

Convenient relamping and cap changing from front of panel.

Spot illumination available in single and bicolor LEDs.

Correct LED polarity and cap orientation assured by molded guides.

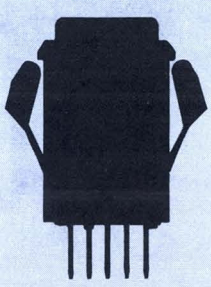
Panel sealed model meets IP 65 of IEC 529 specifications (similar to NEMA 4 & 13).



Stainless steel clips provide secure mounting with a wide range of panel thicknesses.

Latchdown feature gives indication of circuit status. Audible and tactile feedback with smooth and responsive operation.

Actual Size



Snap-action contact mechanism gives long electrical life and sensitivity of actuator.

Combination solder lug and .110″ quick connect terminals are epoxy sealed to prevent entry of flux, dust, and other contaminants.

Compact switch design minimizes behind panel depth.

NKK SERIES LB

STANDARD SIZE/SNAP-IN & REAR PANEL MOUNTING

APPLICATION DATA

LB devices are power and logic-level rated and are available with single or double pole and maintained or momentary circuits. Models rated 3 amps @ 125/250V AC and 0.4VA @ 28V AC/DC maximum are UL recognized and CSA certified. These standard size switches have solder lug/.110" quick connect terminals; straight PC terminals are available on the optional adaptor. Matching indicators are also offered.

Front Panel appearance can be enhanced with the wide selection of cap styles, illumination types, and accessories.

Square
Round
Rectangular

Black or Gray
Built-in Bezel

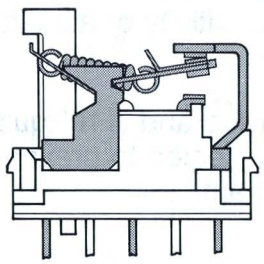
Incandescent or Neon Lamps
Bicolor or Single Color LEDs

Solid Colored, Colored Insert,
LED, & Spot Illuminated Caps

Barriers
Splash Covers
Dustcovers

SNAP-ACTION MECHANISM

NKK's LB switch is designed with a single break snap-action contact mechanism. The combined butterfly formation and spring action of the movable contact create the quick-make, quick-break characteristic which limits arcing and prolongs electrical life. Sensitivity of actuation is an additional result of this design. The switch is offered with momentary or maintained circuits in single or double pole configurations.



PANEL SEAL MODEL

A new dimension has been added to the LB Series with the development of the industrial control version which is oil, dust, and watertight. By means of exterior and interior rubber seals, contaminants are prevented from entering at the front of the panel. The panel seal model is qualified to IP 65 of IEC 529 standards (similar to NEMA 4 & 13).

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NKK SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/SNAP-IN MOUNTING/SNAP ACTION

GENERAL SPECIFICATIONS

	With Silver Contacts for Power Circuits	With Gold Contacts for Logic Level Circuits
Electrical Capacity: (Resistive Load)	3A @ 125V AC 3A @ 250V AC 3A @ 30V DC	0.4VA maximum @ 28V AC/DC max (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	50 milliohms maximum	100 milliohms maximum
Insulation Resistance:	200 megohm minimum @ 500V DC	200 megohm minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC min between contacts & case	1,000V AC minimum between contacts 1,500V AC min between contacts & case
Mechanical Life:	1,000,000 operations min for momentary 200,000 operations min for maintained	1,000,000 operations min for momentary 200,000 operations min for maintained
Electrical Life:	100,000 operations minimum	100,000 operations minimum
Ambient Temp Range:	-15°C through +50°C (+5°F through +122°F) for illuminated -15°C through +70°C (+5°F through +158°F) for nonilluminated Note: When used with a polyvinyl chloride splash cover, the lowest limit is 0°C (32°F).	
Nominal Operating Force:	450 grams	450 grams
Travel:	For Momentary Circuits:	For Maintained Circuits:
	Pretravel 1.9mm (.075") Overtravel 1.1mm (.043") Total Travel 3.0mm (.118")	Pretravel 2.2mm (.087") Overtravel 0.8mm (.031") Total Travel 3.0mm (.118")

MATERIALS & FINISHES

Housing	Glass fiber reinforced polyamide (94V-1 UL Flammability Rating)
Snap-in Frame	Stainless steel
Movable Contact	Silver alloy or Copper with gold plating over nickel plating
Stationary Contacts	Silver allow or Copper with gold plating over nickel plating
Base	Diallylphthalate (94V-0 UL Flammability Rating)
Common Terminals	Phosphor bronze with silver or gold plating
End Terminals	Phosphor bronze with silver or gold plating
Lamp Terminals	Phosphor bronze with silver plating

UL & CSA

LB switches are recognized by Underwriters Laboratories Inc. at the following rating:
3 amps @ 125V or 250V AC
0.4VA @ 28V AC/DC
UL File No. E44145

LB switches are certified by Canadian Standards Association at the following ratings:
3 amps @ 125V or 250V AC and
0.4VA @ 28V AC/DC max
CSA File Nos. LR 23535 and LR56017

SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/SNAP-IN MOUNTING/SNAP ACTION

TYPICAL SWITCH ORDERING EXAMPLE

LB	2	6	R	G	W01

POLES	
1	SPDT
2	DPDT

SHAPES	
S	Square
C	Round
R	Rectangular

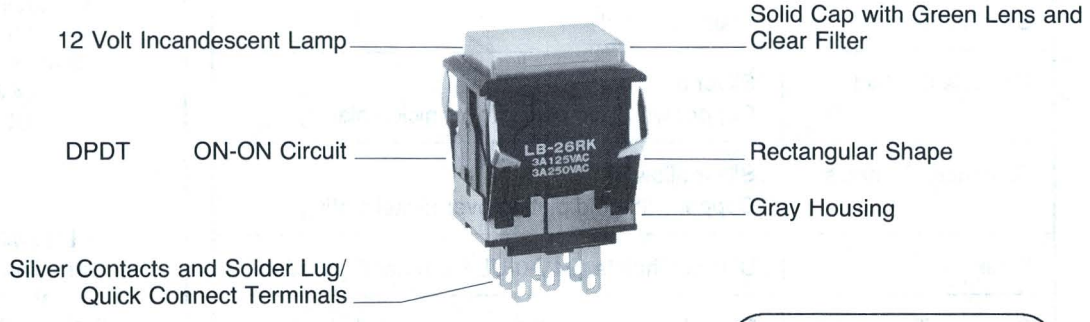
HOUSING	
K	Black
G	Gray

CIRCUITS		
5	ON	(ON)
6	ON	ON
( ) = Momentary		

CONTACTS & TERMINALS	
W01	Silver Contacts and Solder Lug/Quick Connect Terminals
G01	Gold Contacts and Solder Lug/Quick Connect Terminals

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (LB26RGW01–12–FJ):

SERIES LB PUSHBUTTON



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

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AND ASSEMBLY ORDERING EXAMPLE

— 12 — FJ

LAMPS

Incandescent Lamp used with Solid Cap	
00	No Lamp
05	5 Volt
12	12 Volt
28	28 Volt

Incandescent or Neon Lamp used with Insert Cap	
00	No Lamp
01	110 Volt Neon
05	5 Volt Incandescent
12	12 Volt Incandescent
28	28 Volt Incandescent

Single Element LED used with Single Element LED Cap	
10	Single Element

LED used with Spot Illuminated Cap	
1C	Red Single Color
1E	Yellow Single Color
1F	Green Single Color
CF	Red/Green Bicolor

Nonilluminated Cap	
00	No Lamp Is Included

CAP TYPES & COLOR COMBINATIONS

Solid Cap Lens/Filter Colors	
BJ	White with Clear
CJ	Red with Clear
EJ	Yellow with Clear
FJ	Green with Clear
GJ	Blue with Clear

Insert Cap Lens/Filter Colors	
JB	Clear with White
JC	Clear with Red
JE	Clear with Yellow
JF	Clear with Green
JG	Clear with Blue
Note: JF & JG not available w/neon.	

Cap for Single Element LED Diffuser/LED Colors	
CC	Red with Red
EE	Yellow with Yellow
FF	Green with Green

Spot Illuminated Cap Cap Colors	
A	Black
B	White
C	Red
F	Green
Available in square and round only.	

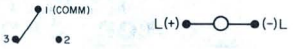
Nonilluminated Cap Cap Colors						
A	B	C	E	F	G	H

Color Codes: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray **J** Clear

SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/SNAP-IN MOUNTING/SNAP ACTION

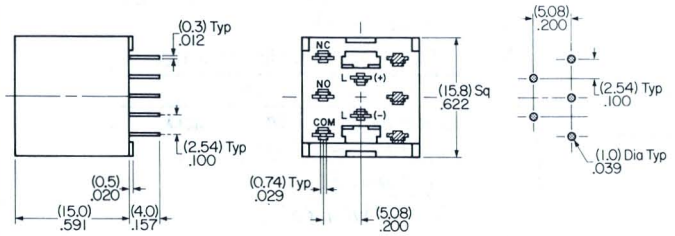
POLES AND CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary Normal	Down
SPDT	LB15 LB16	ON ON	(ON) ON
CONNECTED TERMINALS		1-3	1-2
SCHEMATICS Power/Lamp			
DPDT	LB25 LB26	ON ON	(ON) ON
CONNECTED TERMINALS		1-3 4-6	1-2 4-5
SCHEMATICS Power/Lamp			

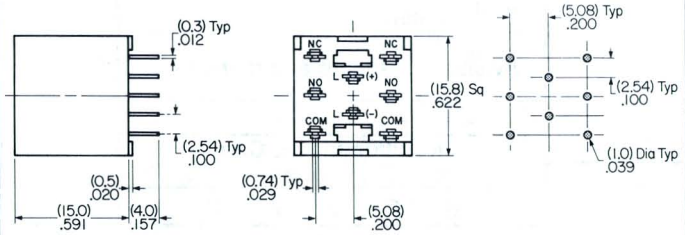
Terminal numbers are not actually on the switch but labels are (NC, NO, COM, L+, L-). Lamp circuit is isolated and requires an external switch.

OPTIONAL PCB ADAPTORS

AT711
Single Pole
Straight PC Terminals



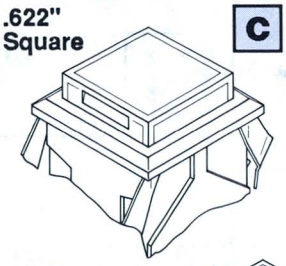
AT712
Double Pole
Straight PC Terminals



Note: Adaptors ordered separately.

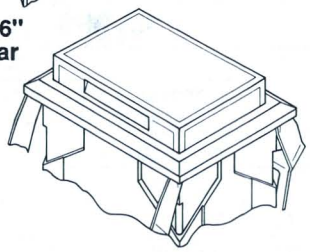
SHAPES

S .622" Square



C .854" Dia. Round

R .622" x .866" Rectangular



HOUSING

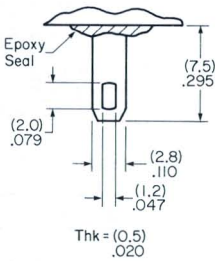
K Black

G Gray

RATING, CONTACT MATERIAL AND TERMINAL TYPES

W01

Power Circuit (3A)
Silver Contacts
Solder Lug/Quick Connect Terminals



G01

Logic Level Circuit (0.4VA)
Gold Contacts
Solder Lug/Quick Connect Terminals

Typical mating connector
AMP #42068-1 (reel)
#42470-1 (loose piece)

WIRING AND SOLDERING

The solder lug/quick connect terminals have a .047" x .079" oblong hole which accommodates one solid 18-gauge wire or two solid or stranded 20-gauge wires.

Soldering time and temperature limits:

3 seconds @ 350°C
5 seconds @ 270°C

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NKK SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/SNAP-IN MOUNTING/SNAP ACTION

LAMPS

The lamp circuit is independent of the switching operation. Dimension drawings of lamps and LEDs are in the accessories section at the end of this catalog. The electrical specifications shown below are determined at a basic temperature of 25°C. If the source voltage exceeds rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula at the end of this catalog.

Incandescent Lamp

05 5 Volt
12 12 Volt
28 28 Volt

AT607
Used with Solid Colored and Colored Insert Caps
T-1 Standard Bi-pin

ELECTRICAL SPECIFICATIONS				
Voltage	V	5V AC	12V AC	28V AC
Current	I	115mA	60mA	24mA
Endurance	Hours	7,000 average		

Neon Lamp

01 110 Volt

AT607N
Used with Colored Insert Cap
T-1 Standard Bi-pin

ELECTRICAL SPECIFICATIONS		
Voltage	V	110V AC
Current	I	1.5mA
Endurance	Hours	10,000 average
Recommended Resistors:		33K ohms for 110V AC 100K ohms for 220V AC

Single Element LED

10 Single Element

AT614

T-1½ Cylindrical
Used with LED Cap

ELECTRICAL SPECIFICATIONS				
		Red	Yellow	Green
Forward Peak Current	I_{FM}	50mA	50mA	50mA
Continuous Forward Current	I_F	40mA	40mA	40mA
Forward Voltage	V_F	1.75V	2.35V	2.35V
Reverse Peak Voltage	V_{RM}	4V	4V	4V
Current Reduction Rate Above 25°C	ΔI_F	0.67mA/°C	0.67mA/°C	0.67mA/°C

LED For Spot Illuminated Caps

1C Red Single Color
1E Yellow Single Color
1F Green Single Color
CF Red/Green Bicolor

LED factory assembled in Spot Illuminated Caps; ***Not Available Separately***

ELECTRICAL SPECIFICATIONS					
		Single Color			Bicolor
		Red	Yellow	Green	Red/Green
Forward Peak Current	I_{FM}	10mA	20mA	30mA	50mA
Continuous Forward Current	I_F	8mA	16mA	24mA	25mA
Forward Voltage	V_F	1.9V	1.9V	2V	2V
Reverse Peak Voltage	V_{RM}	5V	4V	5V	—
Current Reduction Rate Above 25°C	ΔI_F	0.13mA/°C	0.27mA/°C	0.40mA/°C	0.67mA/°C

SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/SNAP-IN MOUNTING/SNAP ACTION

CAP TYPES & COLOR COMBINATIONS

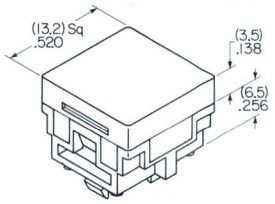
Color Codes: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray **J** Clear

Solid Cap for Incandescent Lamp

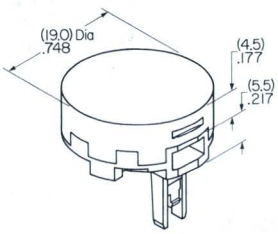
Lens/Filter Color Codes:

BJ
CJ
EJ
FJ
GJ

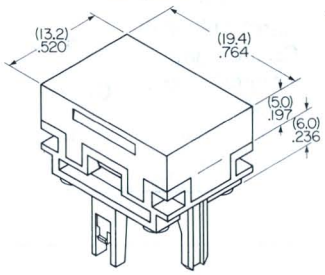
AT476 Square

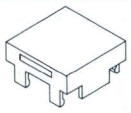


AT4012 Round



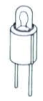
AT4026 Rectangular





Translucent Colored Lens

Transparent Clear Filter



Lamp AT607

Polycarbonate (94V-2 UL Flammability Rating)

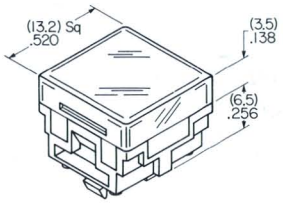
Colored Insert Cap for Incandescent or Neon Lamp

Lens/Filter Color Codes:

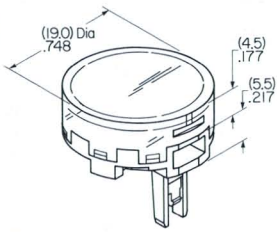
JB
JC
JE
JF
JG

JG & JF not available with neon

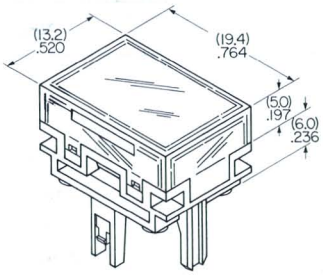
AT477 Square



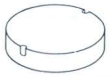
AT4013 Round



AT4027 Rectangular



Transparent Clear Lens



Translucent Colored Filter

Lamps AT607 or AT607N

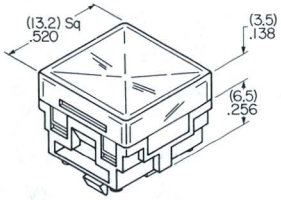
Polycarbonate (94V-2 UL Flammability Rating)

Cap For Single Element LED

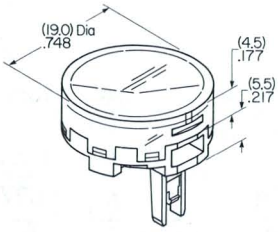
Diffuser/LED Color Codes:

CC
EE
FF

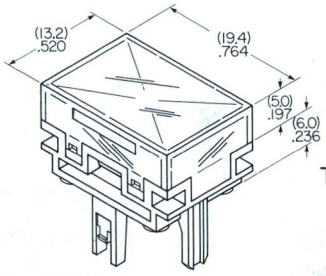
AT478 Square

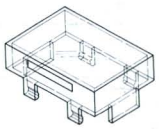


AT4014 Round

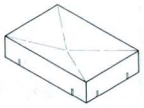


AT4028 Rectangular





Transparent Clear Lens



Translucent Colored Diffuser

Colored LED AT614

Polycarbonate (94V-2 UL Flammability Rating)

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NKK SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/SNAP-IN MOUNTING/SNAP ACTION

CAP TYPES & COLOR COMBINATIONS

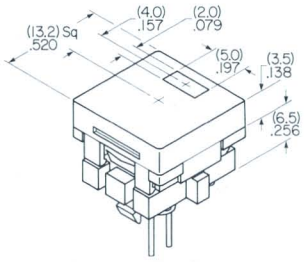
Color Codes: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray **J** Clear

Spot Illuminated Cap with LED

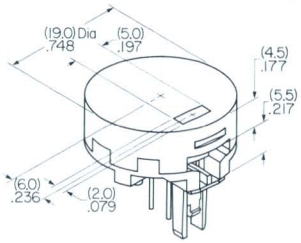
Cap Color Codes:

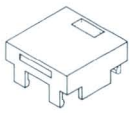
A
B
C
F

AT480 Square



AT4016 Round





Cap with Window

Factory Assembled Colored LED

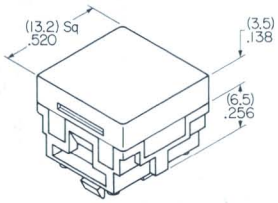
Polycarbonate

Nonilluminated Cap

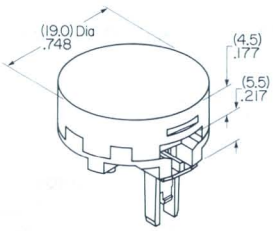
Cap Color Codes:

A
B
C
E
F
G
H

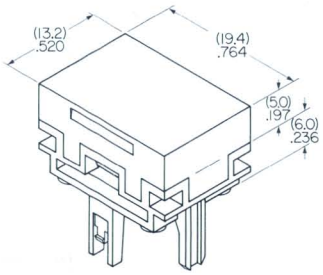
AT484 Square

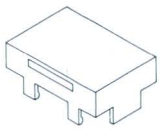


AT4017 Round



AT4030 Rectangular





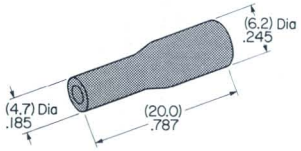
Cap

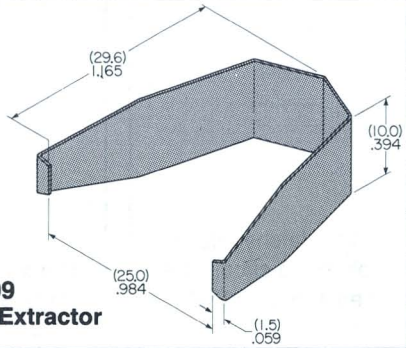
No Lamp

Polycarbonate (94V-2 UL Flammability Rating)

TOOLS

AT107 Lamp Extractor

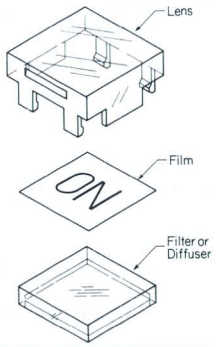




AT109 Cap Extractor

INSCRIPTIONS

Inscriptions can be placed on the lens, diffuser/filter, or a film inserted between the two. Details regarding hot stamping or engraving can be obtained from the factory.



SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/SNAP-IN MOUNTING/SNAP ACTION

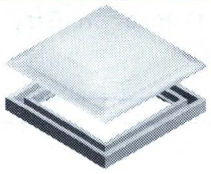
Pushbuttons

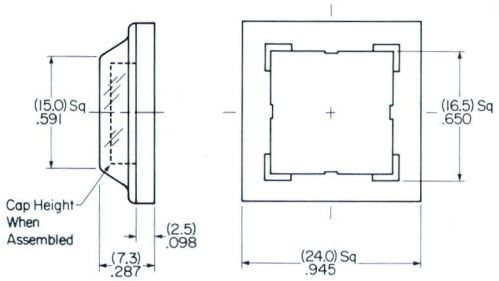
Illuminated

OPTIONAL ACCESSORIES

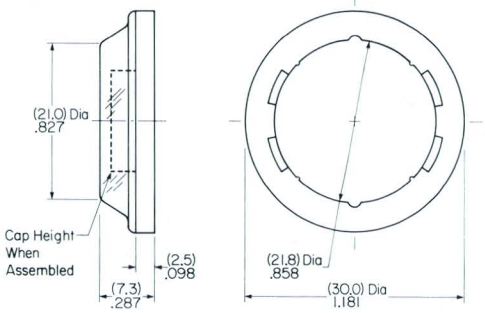
Splash Covers

AT40001 Square
Material: Polyvinyl chloridewith polyethylene gasket.

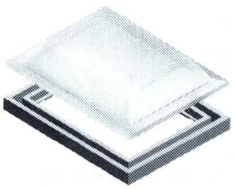


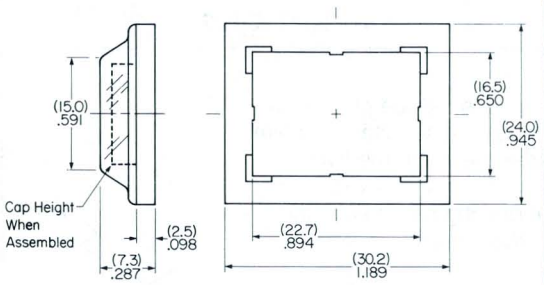


AT4002 Round
Material: Polyvinyl chloridewith polyethylene gasket.



AT4011 Rectangular
Material: Polyvinyl chloride with polyethylene gasket.



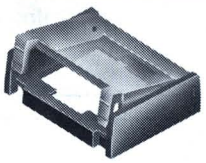


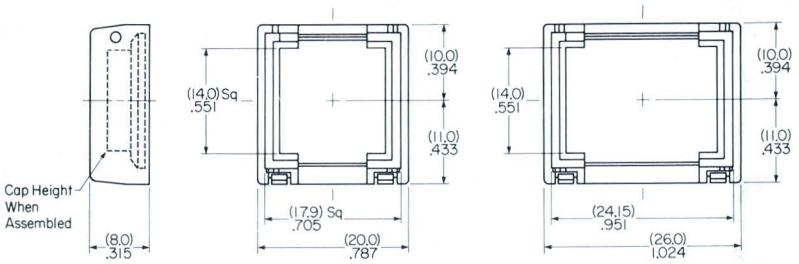
Splash Covers
reduce depth of switch behind panel by .020".
Polyvinyl chloride loses pliability below 0°C (32°F).

Protective Guards

AT499 Square
Material: Polyamide

AT4057 Rectangular
Material: Polyamide

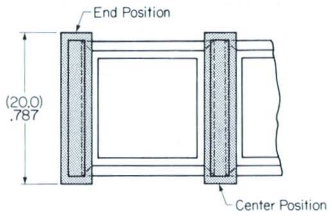


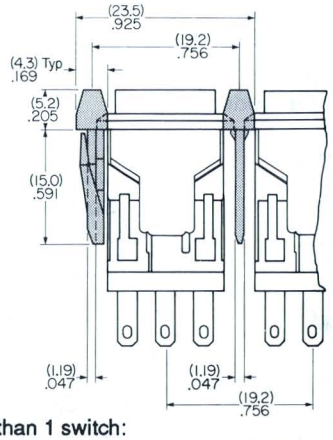


Protective Guards reduce depth of switch behind panel by .020".

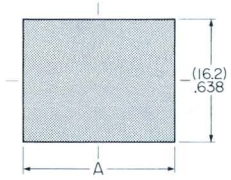
Barriers

AT497 Material: Polyamide



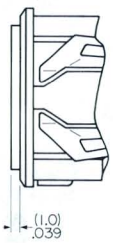


AT498 Material: Polyamide



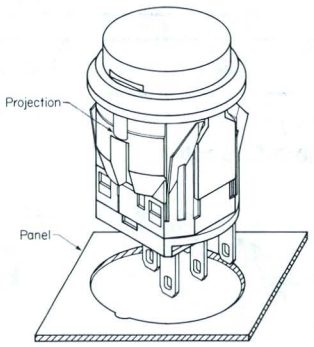
Cutouts for more than 1 switch:
Square .752" X Number of Switches + .051" = A
Rectangular .996" X Number of Switches + .051" = A

LATCHDOWN



When cap is latched down for the alternate circuit, it is positioned 1.0mm (.039") above the built-in bezel.

SNAP-IN MOUNTING



The switch is inserted from the front of the panel & held firmly in place by the stainless steel clip or frame.

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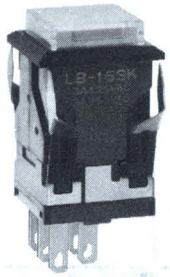
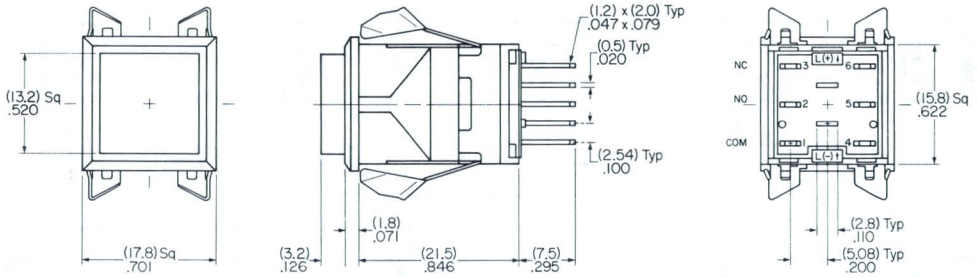
NKK SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/SNAP-IN MOUNTING/SNAP ACTION

Square/Solder Lug/Quick Connect Terminals/1-2 Pole

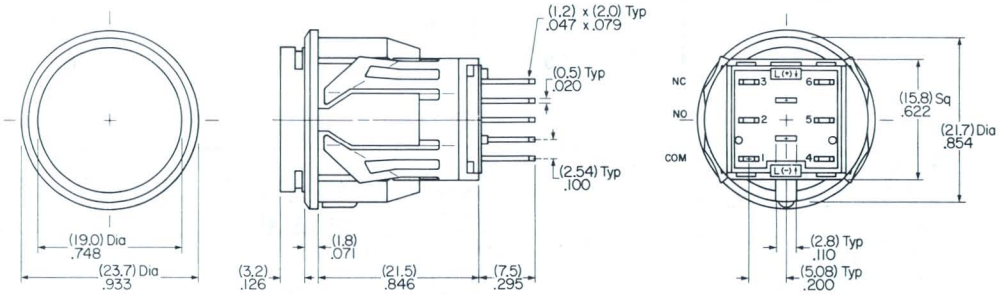




LB15SKW01-28-CJ Model Shown

Terminals 4, 5 & 6 are not on single pole models.

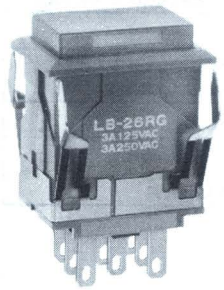
Round/Solder Lug/Quick Connect Terminals/1-2 Pole

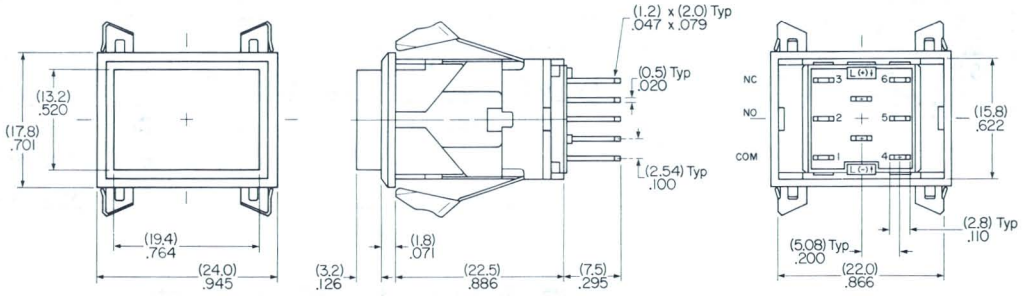


LB16CKW01-28-CJ Model Shown

Terminals 4, 5 & 6 are not on single pole models.

Rectangular/Solder Lug/Quick Connect Terminals/1-2 Pole



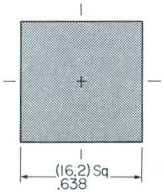


LB26RSKW01-28-CJ Model Shown

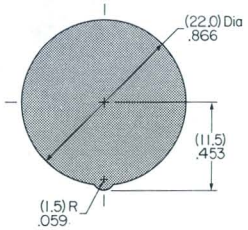
Terminals 4, 5 & 6 are not on single pole models.

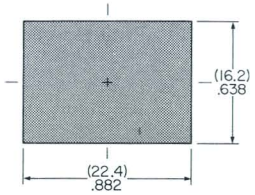
EFFECTIVE PANEL THICKNESS & PANEL CUTOUTS

Panel Thickness:	For Switches & Barriers: 1 ~ 4mm (.039" ~ .157")	For Protective Guards & Splash Covers: 1 ~ 3.5mm (.039" ~ .138")
Panel Cutouts:	Cutout for switch is .638" X .638"	Cutout for switch is .638" X .882"



Cutout for 1 switch with barriers is .638" X .815".





Cutout for 1 switch with barriers is .638" X 1.059".

NKK SERIES LB INDICATORS

STANDARD SIZE/SNAP-IN MOUNTING

TYPICAL INDICATOR ORDERING EXAMPLE

LB 01 G W01 — 28 — FJ

SHAPES	
01	Square
02	Round
03	Rectangular

HOUSING	
K	Black
G	Gray

TERMINALS	
W01	Silver Solder Lug/ Quick Connect

LAMPS

Incandescent Lamp used with Solid Cap	
05	5 Volt
12	12 Volt
28	28 Volt

Incandescent or Neon Lamp used with Insert Cap	
01	110 Volt Neon
05	5 Volt Incandescent
12	12 Volt Incandescent
28	28 Volt Incandescent

Single Element LED used with Single Element LED Cap	
10	Single Element

CAP TYPES & COLOR COMBINATIONS

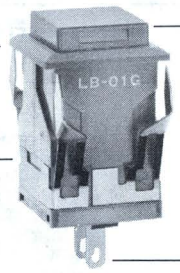
Solid Cap Lens/Filter Colors	
BJ	White with Clear
CJ	Red with Clear
EJ	Yellow with Clear
FJ	Green with Clear
GJ	Blue with Clear

Insert Cap Lens/Filter Colors	
JB	Clear with White
JC	Clear with Red
JE	Clear with Yellow
JF	Clear with Green
JG	Clear with Blue
Note: JF & JG not available w/neon.	

Cap for Single Element LED Diffuser/LED Colors	
CC	Red with Red
EE	Yellow with Yellow
FF	Green with Green

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (LB01GW01-28-FJ):

SERIES LB INDICATOR



28V Incandescent Lamp

Gray Housing and Square Shape

Solid Cap with Green Lens and Clear Filter

Silver Solder Lug/Quick Connect Terminals

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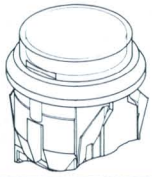
NKK SERIES LB INDICATORS

STANDARD SIZE/SNAP-IN MOUNTING

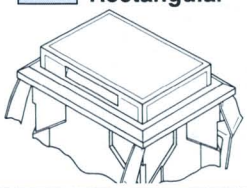
SHAPES

01 Square

02 Round



03 Rectangular



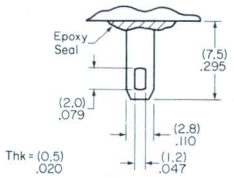
HOUSING

K Black

G Gray

TERMINALS

W01 Silver Solder Lug/ Quick Connect



LAMPS

Electrical specifications and additional information on lamps/ LED are given in the section for snap-in mounted switches.

Incandescent Lamp

05 5 Volt

12 12 Volt

28 28 Volt

T-1 Standard Bi-pin

AT607
Used with Solid Colored and Colored Insert Caps

Neon Lamp

01 110 Volt

T-1 Standard Bi-pin

AT607N
Used with Colored Insert Cap

LED

10 Single Element

T-1½ Cylindrical

AT614
Used with LED Cap

CAP TYPES & COLOR COMBINATIONS

Color Codes:

A Black	**F** Green
B White	**G** Blue
C Red	**H** Gray
E Yellow	**J** Clear

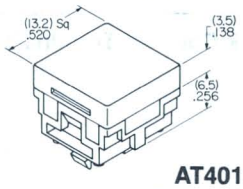
Polycarbonate has 94V-2 UL Flammability Rating.

Solid Cap

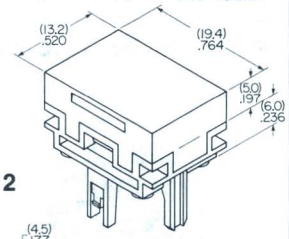
Lens/Filter Color Codes:

BJ **CJ** **EJ** **FJ** **GJ**

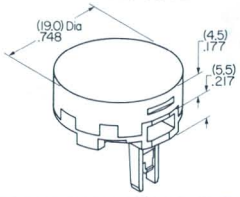
AT476



AT4026



AT4012



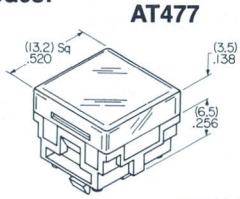
Polycarbonate

Colored Insert Cap

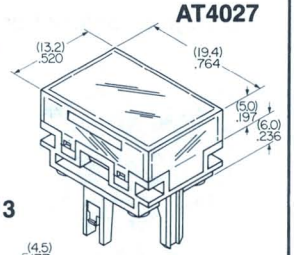
Lens/Filter Color Codes:

JB **JC** **JE** **JF** **JG**

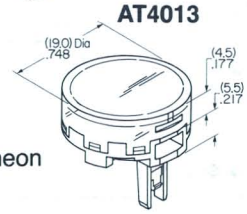
AT477



AT4027



AT4013



JG & JF not available with neon

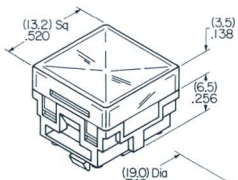
Polycarbonate

Cap for Single Element LED

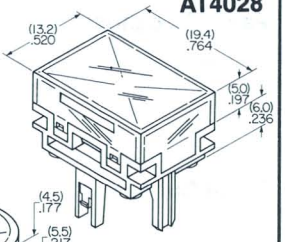
Diffuser/LED Color Codes:

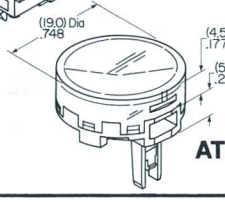
CC **EE** **FF**

AT478



AT4028





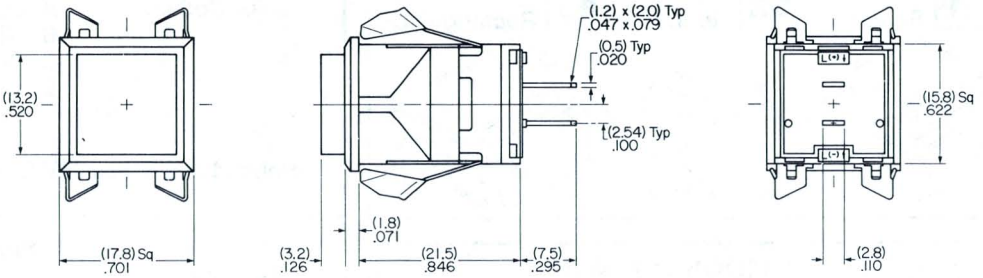
Polycarbonate

AT4014

SERIES LB INDICATORS

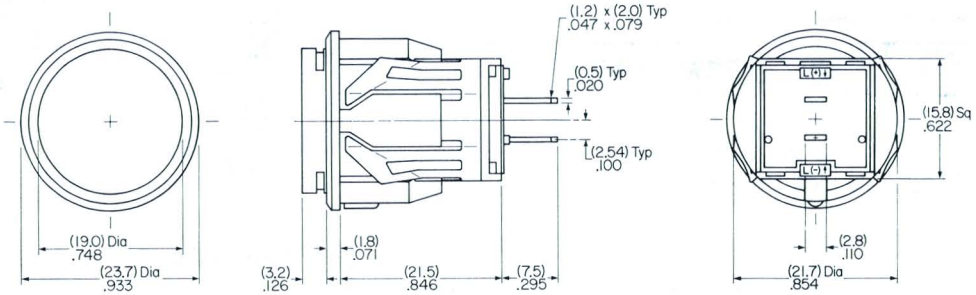
STANDARD SIZE/SNAP-IN MOUNTING

Square/Solder Lug/Quick Connect Terminals



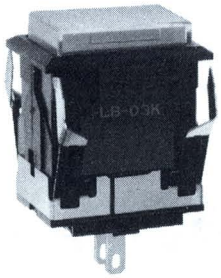
LB01KW01-28-CJ Model Shown

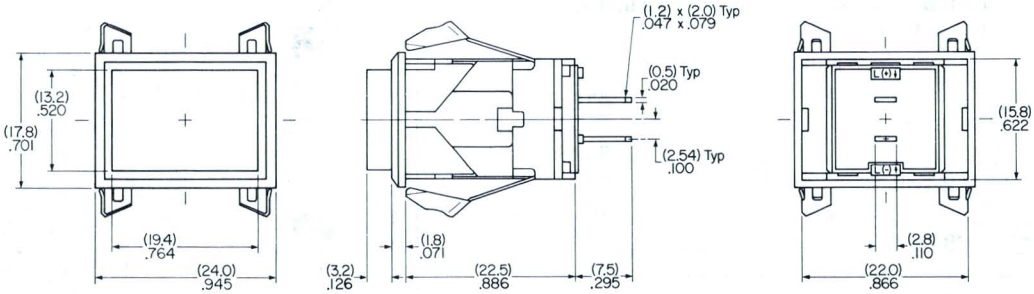
Round/Solder Lug/Quick Connect Terminals/



LB02KW01-28-CJ Model Shown

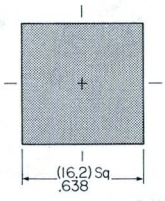
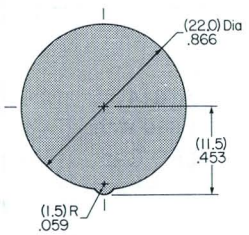
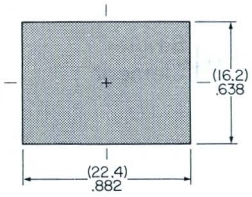
Rectangular/Solder Lug/Quick Connect Terminals





LB03SKW01-28-CJ Model Shown

EFFECTIVE PANEL THICKNESS & PANEL CUTOUTS

Panel Thickness:	1 ~ 4mm (.039" ~ .157")		
Panel Cutouts:			

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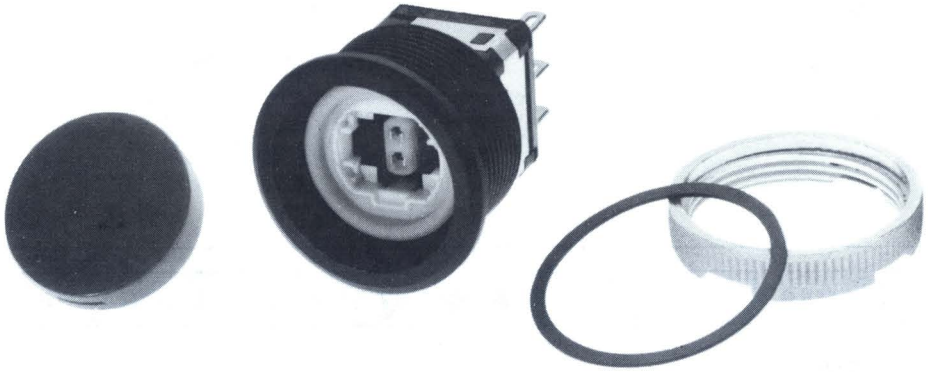
NKK SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/REAR PANEL MOUNTING/PANEL SEAL

APPLICATION DATA

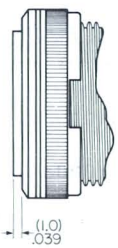
The LB Panel Seal model features those same fine characteristics found in the snap-in models: snap-action contact mechanism, latchdown on alternate action circuits, epoxy sealed solder lug/.110" quick connect terminals, compact behind panel depth, guides for LED polarity and cap orientation, convenient relamping, bright full surface illumination, momentary and alternate action circuits in single and double pole.



The distinction of the LB Panel Seal switch is found in its unique construction whereby potentially harmful substances are sealed out of the contact mechanism. This model is well suited to industrial control settings where a control panel might be exposed to spraying water or oil or blowing particles such as dust.

LATCHDOWN DIMENSION

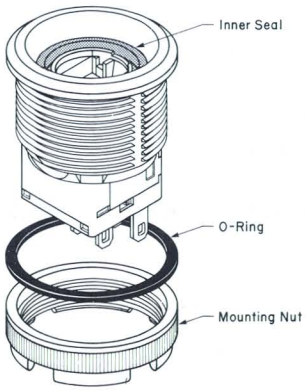
When the cap is latched down for the alternate action circuit, it is positioned 1.0mm (.039") above the built-in bezel.



PANEL SEAL CONSTRUCTION

This device includes two rubber seals that protect the contact mechanism from oil, dust, water, and other contaminants which could otherwise enter from the front panel. The exterior nitrile butadiene rubber o-ring (AT075) is positioned between the built-in bezel and the panel when the switch is mounted. The interior seal is a rolled sleeve of silicone rubber surrounding the innef mechanism.

The Panel Seal model is qualified to IP 65 of IEC 529 standards (similar to NEMA 4 and 13).



NKK SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/REAR PANEL MOUNTING/PANEL SEAL

GENERAL SPECIFICATIONS

	Silver Contacts for Power Circuit	Gold Contacts for Logic Level Circuit
Electrical Capacity: (Resistive Load)	3A @ 125V AC 3A @ 250V AC	0.4VA max @ 28V AC/DC max (Applicable Range: 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	50 milliohms maximum	100 milliohms maximum
Insulation Resistance:	200 megohms minimum at 500V DC	200 megohms minimum at 500V DC
Dielectric Strength:	1,000V AC minimum between contacts	1,000V AC minimum between contacts
	1,500V AC minimum between contacts and case	1,500V AC minimum between contacts and case
Mechanical Life:	1,000,000 operations minimum for momentary circuits	1,000,000 operations minimum for momentary circuits
	200,000 operations minimum for maintained circuits	200,000 operations minimum for maintained circuits
Electrical Life:	100,000 operations minimum	100,000 operations minimum
Nominal Operating Force:	450 grams	450 grams

MATERIALS AND FINISHES

Housing	Fiberglass reinforced polyamide
O-ring	Nitrile butadiene rubber
Inner Seal	Silicone rubber
Movable Contact	Silver alloy or copper with gold plating over nickel plating
Stationary Contacts	Silver alloy or copper with gold plating over nickel plating
Base	Diallylphthalate
Common Terminal	Phosphor bronze with silver or gold plating
End Terminals	Phosphor bronze with silver or gold plating
Lamp Terminals	Brass with silver plating

AMBIENT TEMPERATURE RANGE

Illuminated	−15°C through +50°C (+5°F through +122°F)
Nonilluminated	−15°C through +70°C (+5°F through +158°F)

TRAVEL

	Momentary	Maintained
Pretravel	1.7mm (.067″)	1.6mm (.063″)
Overtravel	1.3mm (.051″)	0.8mm (.031″)
Total Travel	3.0mm (.118″)	2.4mm (.094″)

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NKK SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/REAR PANEL MOUNTING/PANEL SEAL

TYPICAL SWITCH ORDERING EXAMPLE

LB 1 6 W K W01 — 28 — JG

POLES	
1	SPDT
2	DPDT

HOUSING	
K	Black
G	Gray

CONTACTS & TERMINALS	
W01	Silver Contacts and Solder Lug/Quick Connect Terminals
G01	Gold Contacts and Solder Lug/Quick Connect Terminals

CIRCUITS		
5	ON	(ON)
6	ON	ON
( ) = Momentary		

SHAPE	
W	Round

LAMPS

Incandescent Lamp used with Solid Cap	
00	No Lamp
05	5 Volt
12	12 Volt
28	28 Volt

Incandescent or Neon Lamp used with Insert Cap	
00	No Lamp
01	110 Volt Neon
05	5 Volt Incandescent
12	12 Volt Incandescent
28	28 Volt Incandescent

Single Element LED used with Single Element LED Cap	
10	Single Element

CAP TYPES & COLOR COMBINATIONS

Solid Cap Lens/Filter Colors	
BJ	White with Clear
CJ	Red with Clear
EJ	Yellow with Clear
FJ	Green with Clear
GJ	Blue with Clear

Insert Cap Lens/Filter Colors	
JB	Clear with White
JC	Clear with Red
JE	Clear with Yellow
JF	Clear with Green
JG	Clear with Blue
Note: JF & JG not available w/neon.	

Cap for Single Element LED Diffuser/LED Colors	
CC	Red with Red
EE	Yellow with Yellow
FF	Green with Green

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (LB16WKW01-28-JG):

SERIES LB PUSHBUTTON

28V Incandescent Lamp

Round Shape

Black Housing

Insert Cap with Clear Lens and Blue Filter

SPDT ON-ON Circuit

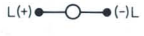
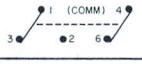
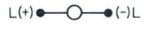
Silver Contacts and Solder Lug/ Quick Connect Terminals

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

NKK SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/REAR PANEL MOUNTING/PANEL SEAL

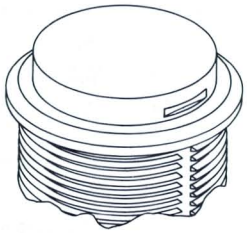
POLES AND CIRCUITS

POLE & THROW	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary Normal	Down
SPDT	LB15 LB16	ON ON	(ON) ON
CONNECTED TERMINALS		1-3	1-2
SCHEMATICS Power/Lamp			
DPDT	LB25 LB26	ON ON	(ON) ON
CONNECTED TERMINALS		1-3 4-6	1-2 4-5
SCHEMATICS Power/Lamp			

Terminal numbers are not actually on the switch but labels are (NC, NO, COM, L+, L-). Lamp circuit is isolated and requires an external switch.

SHAPE

W .866" Dia. Round



HOUSING

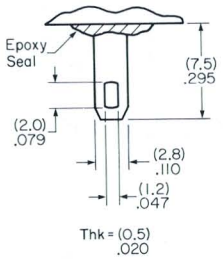
K Black

G Gray

RATING, CONTACT MATERIAL & TERMINALS

W01 Power Circuit (3A)
Silver Contacts
Solder Lug/Quick Connect Terminals

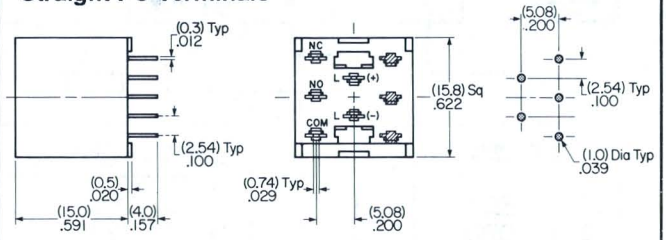
G01 Logic Level Circuit (0.4VA)
Gold Contacts
Solder Lug/Quick Connect Terminals



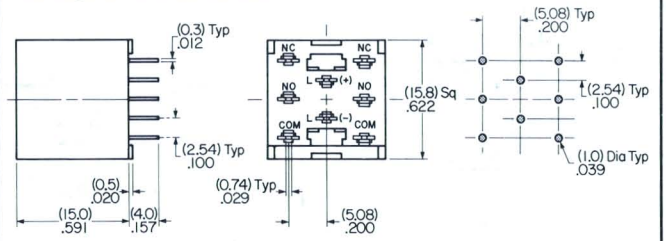
Typical mating connector
AMP #42068-1 (reel)
#42470-1 (loose piece)

OPTIONAL PCB ADAPTORS

AT711
Single Pole
Straight PC Terminals



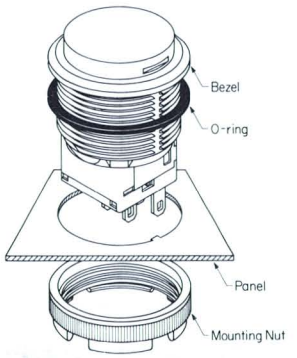
AT712
Double Pole
Straight PC Terminals



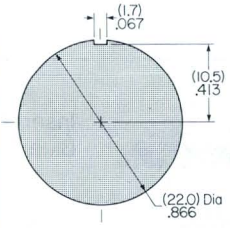
Note: Adaptors ordered separately.

MOUNTING

For bushing mounting, the switch is inserted from the front of the panel with the o-ring between the built-in bezel and the panel. The chromate plated brass mounting nut (AT074), supplied with each switch, is installed from the rear of the panel. Overtightening the mounting nut may damage the switch housing.

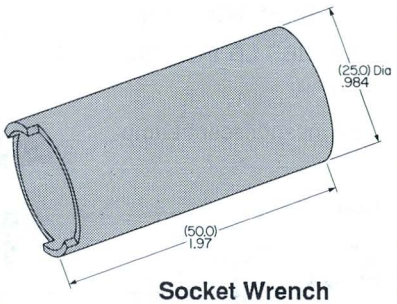


Cutout



Recommended Panel Thickness:
1 ~ 4mm (.039" ~ .157")

AT112



Socket Wrench
for Panel Seal Model

Wiring & soldering specs in previous snap-in switch section.

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NKK SERIES LB PUSHBUTTON SWITCHES

STANDARD SIZE/REAR PANEL MOUNTING/PANEL SEAL

LAMPS

Electrical specifications and additional information on lamps/LED are given in the previous section for snap-in mounted switches.

Incandescent Lamp

05	5 Volt
12	12 Volt
28	28 Volt

Used with Solid Colored and Colored Insert Caps

AT607

T-1 Standard Bi-pin

Neon Lamp

01	110 Volt

Used with Colored Insert Cap

AT607N

T-1 Standard Bi-pin

LED

10	Single Element

Used with LED Cap

AT614

T-1½ Cylindrical

CAP TYPES & COLOR COMBINATIONS

Color Codes:

C Red	**A** Black	**B** White
G Blue	**E** Yellow	**F** Green
	H Gray	**J** Clear

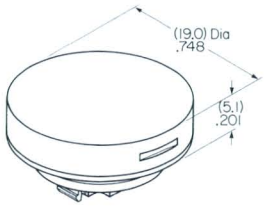
Lens/Filter Color Codes:

Solid Cap

BJ
CJ
EJ
FJ
GJ

Polycarbonate

AT4054



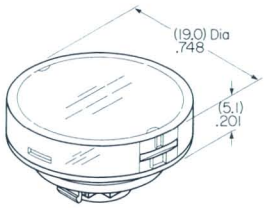
Lens/Filter Color Codes:

Insert Cap

JB
JC
JE
JF
JG

Polycarbonate
JG & JF not available with neon

AT4055



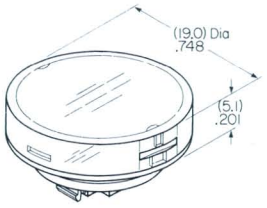
Diffuser/LED Color Codes:

Cap For Single Element LED

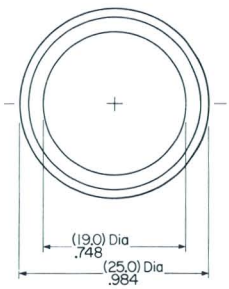
CC
EE
FF

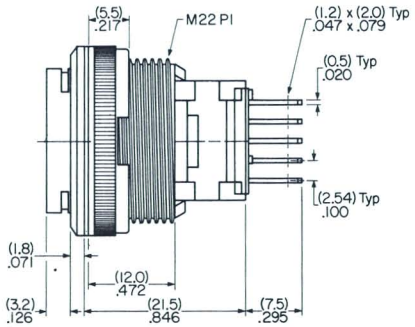
Polycarbonate

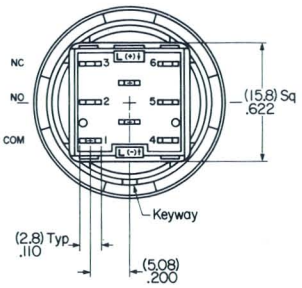
AT4056



Waterproof Model/Solder Lug/Quick Connect Terminals/1-2 Pole







LB25WKW01-12-JC Model Shown

Terminals 4, 5 & 6 are not on single pole models.

NOTES

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NKK SERIES DLB

STANDARD SIZE/PANEL MOUNT/POWER RATED

DISTINCTIVE FEATURES

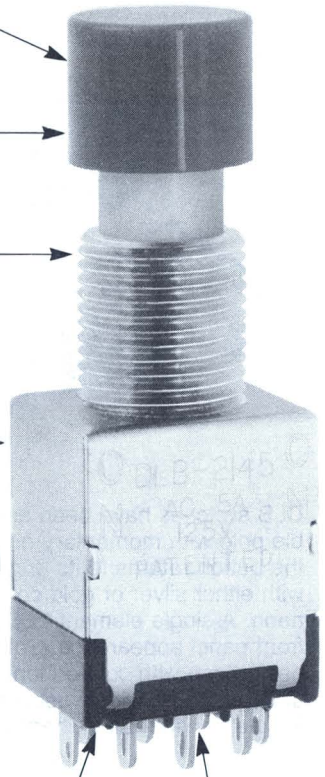
High strength plastic caps available in various styles and shapes. Cap and legend orientation maintained by key slotted design.

Bright, full face illumination to distinctively indicate status.

Rear panel threaded mounting with compact behind panel design or snap-in mounter for front panel mounting.

5 amp power rating standard. Dry circuit capability available.

Patented detent switching mechanism provides positive indication of actuation.

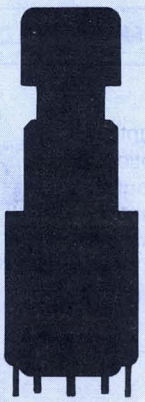


Heavy gauge steel case protects switch components and increases durability.

1500V dielectric strength between contacts and case is accomplished by clinching the frame away from the terminals.

Solder lug and PC terminals staked into base.

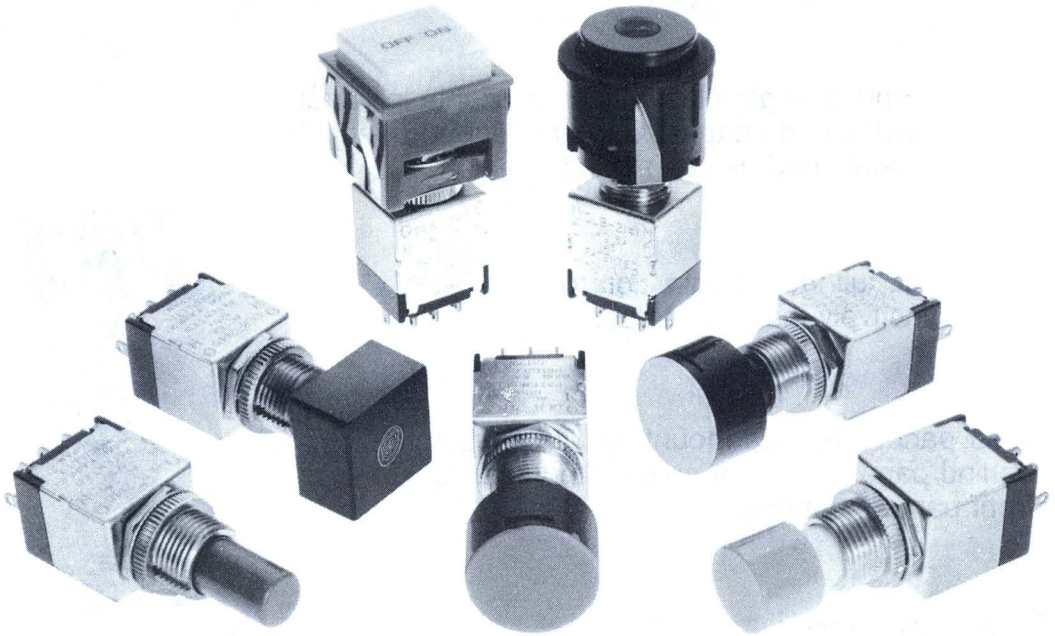
Actual Size



NKK SERIES DLB

STANDARD SIZE/PANEL MOUNT/POWER RATED

APPLICATION DATA



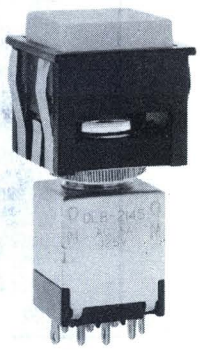
DLB switches have been especially designed for durability and variety of options. These devices are double pole with momentary or alternate action circuits. On alternate action models, after transferring circuit, the button returns to its original position and does not latch down. Solder lug or PC terminals are available with either silver or gold contacts. Lamps are offered in 6, 14, or 28 volts for incandescent or 110 volts for neon. A single element LED provides for spot illumination. The variety of cap styles and colors enhances front panel appearance. Solid colored and spot illuminated caps come in both square and round shapes. A design cap with colored lens is also available. DLB's rugged construction and flexibility have allowed these switches to be widely used in control panels, computer peripherals, as well as machines and equipment for the transportation, health care and communication industries.

BUSHING MOUNTED

Bushings for DLB switches are 12mm in diameter for standard rear panel mounting. Minimal behind panel dimension of .969″ conserves space. The threaded bushing has a keyway to prevent rotation. A hexagon nut, lock washer and face nut are provided with each switch.

SNAP-IN MOUNTED

Front panel snap-in mounting is achieved using the optional snap-in mounter. Both round and square shaped mounters are available in black only. Round mounters have a projection for antirotation. Mounters are fully assembled on switches or may be ordered separately.



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NKK SERIES DLB PUSHBUTTON SWITCHES

STANDARD SIZE/PANEL MOUNT/POWER RATED

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	5A @ 125V AC, 3A @ 250V AC or 3A @ 30V DC for silver contacts 0.4VA maximum @ 28V maximum AC/DC or 5A @ 125V AC for gold over silver contacts (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Contact Resistance:	10 milliohms maximum for silver 20 milliohms maximum for gold
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	-10°C through +50°C (+14°F through +122°F) for illuminated -10°C through +70°C (+14°F through +158°F) for nonilluminated Low temperature lubricant available
Pretravel (Approximate):	1.0mm (.039")
Overtravel (Approximate):	4.0mm (.157")
Total Travel (Approximate):	5.0mm (.196")
Nominal Operating Force:	1,300 grams for momentary; 1,200 grams for alternate action

MATERIALS AND FINISHES

Plunger	Polyacetal resin
Bushing	Brass with chrome plating
Housing	Steel, chromate over zinc
Movable Contact	Silver
Stationary Contacts	Silver with silver plating or silver with gold plating over nickel undercoating
Base	Phenolic resin
Common Terminals	Copper with silver plating
End Terminals	Copper with silver plating or copper with gold plating over nickel undercoating
Lamp Terminals	Brass with nickel plating

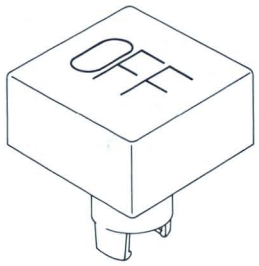
UL RECOGNITION

All models with ratings of 5A @ 125V AC
are recognized by Underwriters Laboratories Inc.
UL File No. E44145

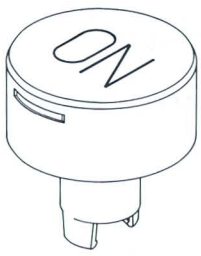
INSCRIPTIONS

Inscriptions can be placed on any of the solid colored caps or the design cap. Details regarding hotstamping or engraving can be obtained from the factory.

Solid Cap



Design Cap



SERIES DLB PUSHBUTTON SWITCHES

STANDARD SIZE/PANEL MOUNT/POWER RATED

TYPICAL SWITCH ORDERING EXAMPLE

DLB 2141 W 01 — L 3 G — ☐

POLE & CIRCUITS			
2141	DPDT	ON	(ON)
2145	DPDT	ON	ON
( ) = Momentary			

TERMINAL TYPES	
01	Solder Lug
03	Straight PC

SNAP-IN MOUNTER	
No Code	No Mounter
S	Black Mounter for Square Caps
R	Black Mounter for Round Caps

CONTACTS & RATINGS	
W	Silver Contacts 5 Amp Rating
A	Gold over Silver Contacts 0.4VA or 5 Amp Rating

LAMPS

Incandescent or Neon used with Solid or Design Caps	
O	No lamp
Incandescent	
E	6 Volt
G	14 Volt
L	28 Volt
Neon	
N	110 Volt
Neon recommended for cap codes 2 & 3 in white only.	

LED used with Spot Illuminated Caps	
D	Single Element

CAP TYPES

Solid Caps	
1	.748″ Square
2	.346″ Dia. Round Not for use w/mounter
3	.512″ Dia. Round Not for use w/mounter
Design Cap	
4	.748″ Dia. Round with colored lens

Spot Illuminated Caps	
6	.748″ Square
7	.748″ Dia. Round

CAP OR LED COLORS

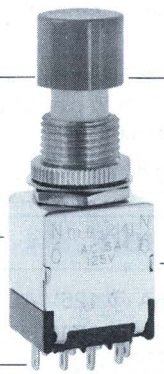
Cap Colors	
B	White
C	Red
D	Orange
E	Yellow
F	Green
G	Blue
Note: Colors D & E not available with Design Cap	

Spot Illuminated Cap LED Colors	
C	Red
F	Green

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (DLB2141W01-L3G):

SERIES DLB PUSHBUTTON

IMPORTANT: Switches are supplied without UL marking unless specified. See Supplement for instructions.



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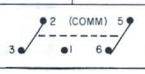
SERIES DLB PUSHBUTTON SWITCHES

STANDARD SIZE/PANEL MOUNT/POWER RATED

POLES AND CIRCUITS

POLE	MODEL	PLUNGER POSITION & TERMINAL NUMBERS ( ) = Momentary — Normal (Keyway)	Down
DPDT	DLB2141 DLB2145	ON ON	(ON) ON
CONNECTED TERMINALS		2–3 5–6	2–1 5–4

SCHEMATIC 

Note: Lamp circuit is isolated & requires an external switch.

Terminal numbers are not actually on the switch.

CONTACTS & RATINGS

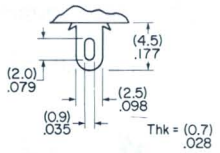
W **Silver**
5 Amp Power Circuit

A **Gold over Silver**
0.4VA Logic Level or 5 Amp Power Circuit

TERMINAL TYPES

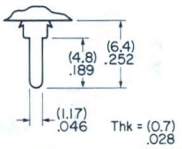
01 **Solder Lug Terminals**

Wiring & soldering details follow.



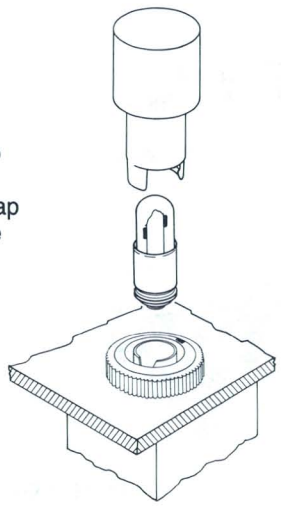
03 **Straight PC Terminals**

Lamp terminal thickness:
0.5mm (.020")



FRONT PANEL RELAMPING

Lamps are easily replaced from the front of the panel without any special tools. Simply remove the one piece cap to expose the lamp. The lamp snaps into the lamp assembly. Two keys projecting from the cap fit securely into slots in the lamp assembly preventing cap rotation.



LAMPS

AT604
Incandescent

E **6 Volt**
G **14 Volt**
L **28 Volt**

Used with Solid Colored and Design Caps

T-1 3/4 Midget Groove Base

When ordering separately, identify voltage after AT number. Example: AT604-14V.

ELECTRICAL SPECIFICATIONS

		6V	14V	28V
Voltage	V			
Current	I	200mA	80mA	40mA
Endurance	Hours	1,000	750	1,000

AT604
Neon

N **110 Volt**

Used with Solid Colored and Design Caps

T-1 3/4 Midget Groove Base

Neon recommended with AT417 & AT418 in white only

ELECTRICAL SPECIFICATIONS

		110V	Recommended Resistor:
Voltage	V		
Current	I	1.5mA	33K ohms for 110V AC
Endurance	Hours	10,000	100K ohms for 220V AC

LED

D **Single Element**

Factory assembled in Spot Illuminated Caps

ELECTRICAL SPECIFICATIONS

		Red	Green
Forward Peak Current	I_{FM}	35mA	30mA
Continuous Forward Current	I_F	25mA	20mA
Forward Voltage	V_F	1.65V	2V
Reverse Peak Voltage	V_{RM}	3V	3V
Current Reduction Rate Above 25°C	ΔI_F	0.57mA/°C	0.43mA/°C

Electrical specifications are determined at a basic temperature of 25°C. Lamp circuit is independent of switch operation. Dimension drawings of lamps are in the accessories section at the end of this catalog. If the source voltage exceeds the lamp's rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula at the end of the catalog.

SERIES DLB PUSHBUTTON SWITCHES

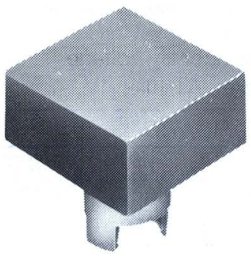
STANDARD SIZE/PANEL MOUNT/POWER RATED

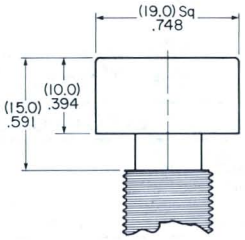
CAP TYPES AND COLORS

Solid Colored Caps

1 **AT419**
.748″ Square

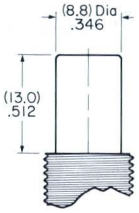
Translucent
Polycarbonate





2 **AT417**
.346″ Dia. Round

Translucent
Polycarbonate



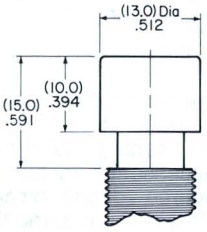
Cap Colors:

- **B** White
- **C** Red
- **D** Orange
- **E** Yellow
- **F** Green
- **G** Blue

Used with Incandescent or Neon Lamp AT604

3 **AT418**
.512″ Dia. Round

Translucent
Polycarbonate

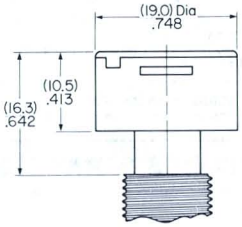


AT417 and AT418 are not for use with snap-in mounter.

Design Cap

4 **AT446**
.748″ Dia. Round
with colored lens

Polycarbonate



Lens Colors:

- **B** White
- **C** Red
- **F** Green
- **G** Blue

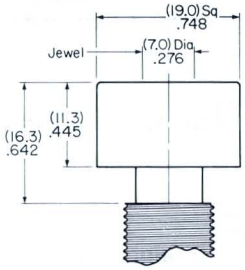
Used with Incandescent Lamp AT604

Black opaque holder with translucent lens.

Spot Illuminated Cap

6 **AT463**
.748″ Square

Polycarbonate



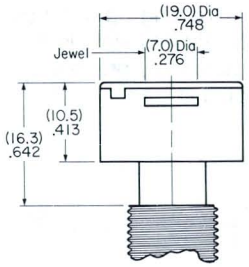
LED Colors:

- **C** Red
- **F** Green

LED factory assembled in cap. Not available as separate pieces.

7 **AT464**
.748″ Dia. Round

Polycarbonate



Black opaque cap with colored LED.

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NKK SERIES DLB PUSHBUTTON SWITCHES

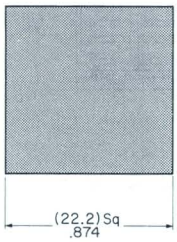
STANDARD SIZE/PANEL MOUNT/POWER RATED

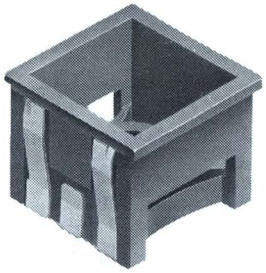
OPTIONAL SNAP-IN MOUNTERS

S **AT517**
Mounter for Square Caps

Fiberglass reinforced nylon
Black only available

Panel Cutout:





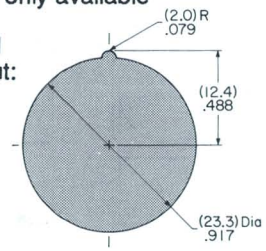
Panel Thickness:
1.0 ~ 4.0mm
(.039 ~ .157")

The standard mounting hardware provided with the switch is used to assemble the squarre mounter.

R **AT528**
Mounter for Round Caps

Fiberglass reinforced nylon
Black only available

Panel Cutout:

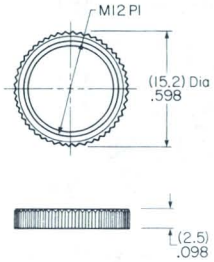


Panel Thickness:
1.0 ~ 4.0mm
(.039 ~ .157")

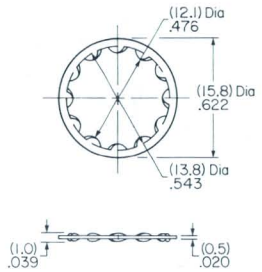
A Locking Ring AT506 and Hex Nut AT527 are provided with the round mounter. It is assembled to the switch with this hardware plus the lockwasher and hex nut provided as standard hardware with the switch. Not for use with Solid Caps AT417 & AT418.

STANDARD MOUNTING HARDWARE PROVIDED WITH SWITCH

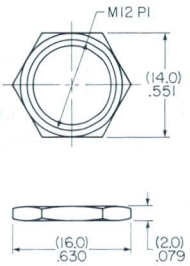
AT504
Knurled Face Nut
Brass with chrome plating



AT508
Lockwasher
Steel with zinc plating

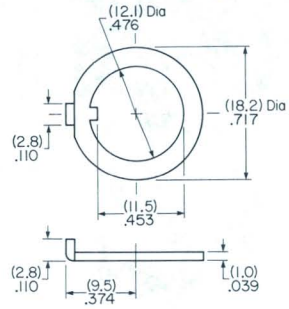


AT527
Hex Nut
Steel with nickel plating

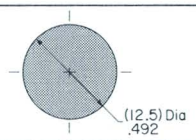
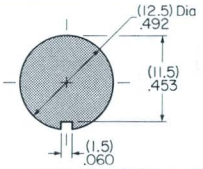
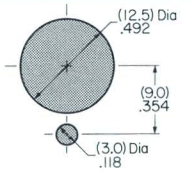


OPTIONAL HARDWARE

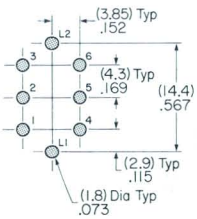
AT506
Locking Ring
Steel with zinc plating



MAX. EFFECTIVE PANEL THICKNESS & CUTOUTS

	Panel Thickness	Panel Cutouts
Bushing Mounting w/Standard Hardware	6.5mm (.256")	
Bushing Mounting w/Standard Hardware and Keyway	6.5mm (.256")	
Bushing Mounting w/Standard Hardware and Locking Ring	5.5mm (.217")	

PC MOUNTING



SOLDERING & WIRING

Soldering

3 seconds at 350°
5 seconds at 270°

Wiring

Dimension of the hole in the power terminals is .035" x .079" and accommodates one solid 20-gauge wire or two solid or stranded 22-gauge wires.

Diameter of the hole for lamp terminals is .035" and accommodates one solid 20-gauge wire.

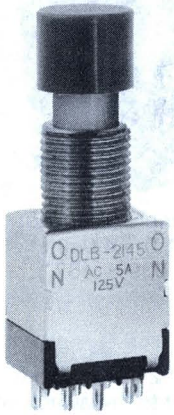
Pushbuttons

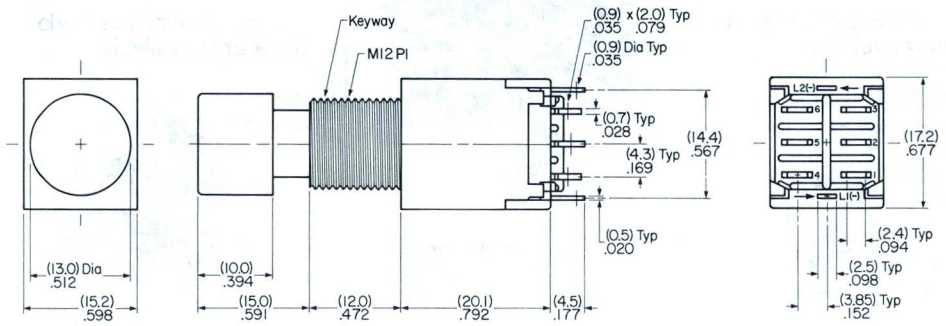
Illuminated

SERIES DLB PUSHBUTTON SWITCHES

STANDARD SIZE/PANEL MOUNT/POWER RATED

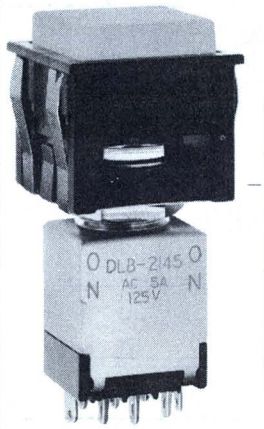
Solder Lug Terminals/Double Pole

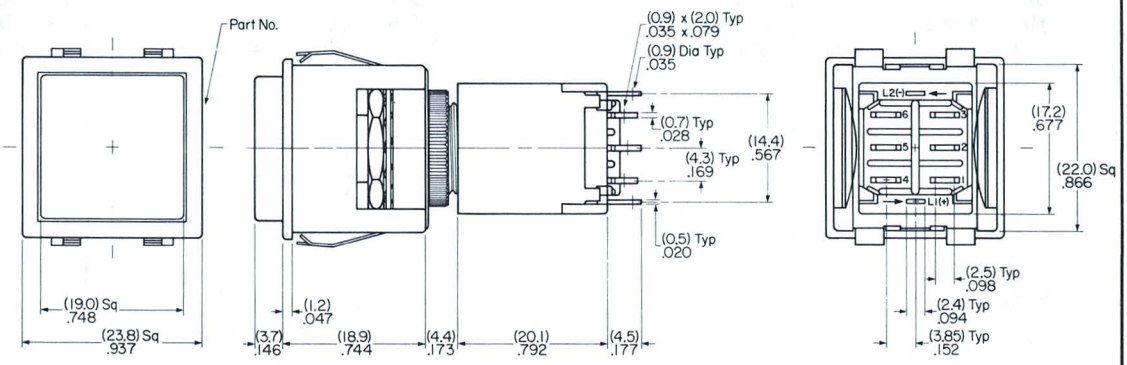




DLB2145W01-G3C Model Shown

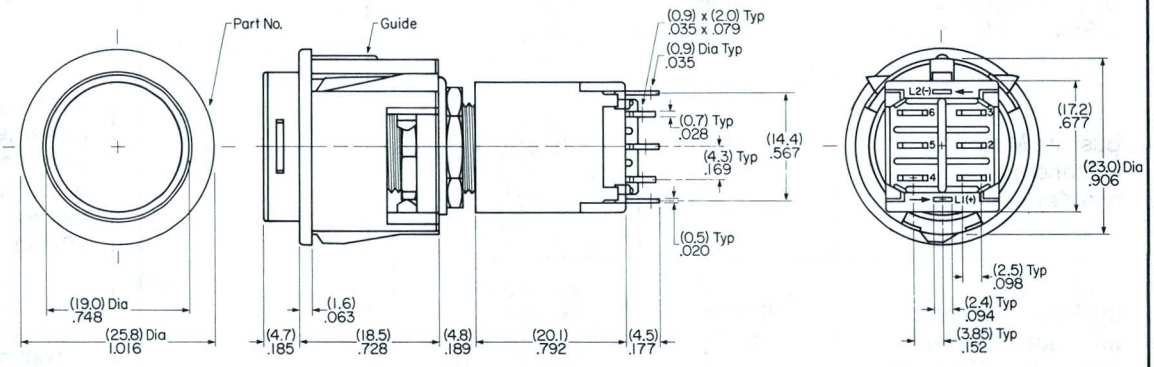
Solder Lug Terminals/Double Pole/with Square Mounter





DLB2145W01-G1C-S Model Shown

Solder Lug Terminals/Double Pole/with Round Mounter



DLB2145W01-E4C-R Model Shown

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NKK SERIES MLW

MINIATURE/SNAP-IN MOUNTED/POWER RATED

DISTINCTIVE FEATURES

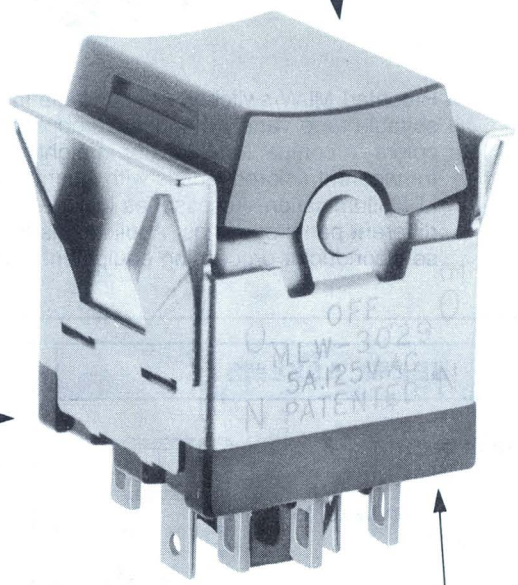
Industry's first miniature snap-in, lighted rocker switch. Patented internationally.

Actuators in various styles operate with firm, well-defined movements.

Interlocking actuator prevents switch failure due to jamming or window locking.

Two bezel sizes adapt to varied panel cutouts.

Unique stainless steel retaining clips securely hold switches over a range of panel thicknesses even when exposed to vibration.



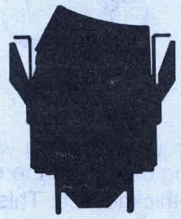
Space conserving front panel mounting with minimum behind panel dimension of .902".

Durable stainless steel housing prevents corrosion.

Isolated lamp circuit for incandescent, LED and neon lamps. Front panel relamping.

Built-in protective cover shields contacts from dust.

Actual Size



Extended lamp terminal for ease of wiring.

Epoxy sealed solder lug terminals lock out flux, dust and other contaminants.

NKK SERIES MLW ROCKER SWITCHES

MINIATURE/SNAP-IN MOUNTED/POWER RATED

GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	5A @ 125V AC
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	Illuminated: −10°C through +50°C (+14°F through +122°F) Nonilluminated: −10°C through +70°C (+14°F through +158°F)
Nominal Operating Force:	Rockers: 1014 grams Paddles: 460 grams
Angle of Throw:	26°

MATERIALS AND FINISHES

Housing	Stainless steel
Movable Contacts	Silver alloy
Stationary Contacts	Silver
Base	Phenolic resin
Common Terminal	Copper with silver plating
End Terminals	Copper with silver plating
Lamp Terminals	Phosphor bronze with nickel plating

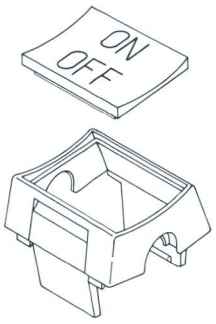
UL & CSA

Double pole models rated 5A @ 125V AC
are recognized by Underwriters Laboratories Inc.
UL File No. E44145
Canadian Standards Association certifies
the double pole models
rated 5A @ 125V AC and 3A @ 250V AC.
CSA File Nos. LR23535 & LR56017

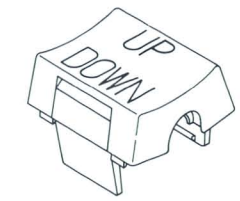
INSCRIPTIONS

Inscriptions can be placed on the design cap lens, rocker cap, indicator cap or bezel. Up to three lines may be inscribed on caps. Details regarding hot stamping or engraving can be obtained from the factory.

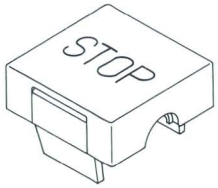
Design Cap



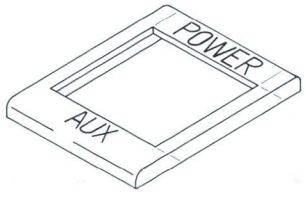
Rocker Cap



Indicator Cap



Bezel



NKK SERIES MLW ROCKER SWITCHES

MINIATURE/SNAP-IN MOUNTED/POWER RATED

TYPICAL SWITCH ORDERING EXAMPLE

MLW30 2 5 — F 8

POLES	
1	SPDT
2	SP3T DPDT

CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
0	ON	ON	ON
( ) = Momentary			

LAMPS

Incandescent Lamps used with Solid or Design Caps	
O	No lamp
E	6 Volt
F	12 Volt
H	18 Volt
K	24 Volt
L	28 Volt

Neon Lamp used with Solid or Design Caps	
N	110 Volt

LED used with Spot Illuminated Cap	
D	Single Element

CAP TYPES

Solid Caps	
1	Rocker
5	Paddle

Design Cap	
8	Black rocker with colored lens

Spot Illuminated Cap	
9	Black rocker with clear window

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AND ASSEMBLY ORDERING EXAMPLE

C — 1 A

CAP OR LED COLORS

Solid Cap Colors	
A	Black
B	White
C	Red
D	Orange
E	Yellow
F	Green
G	Blue

Design Cap Lens Colors	
B	White
C	Red
D	Orange
F	Green
G	Blue

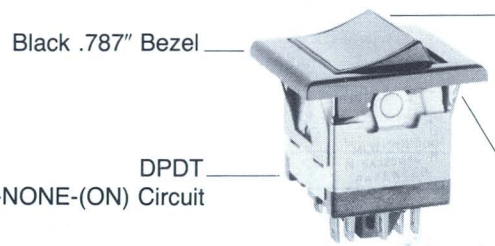
Spot Illuminated Cap LED Colors	
C	Red illumination
F	Green illumination

BEZELS	
1	.787″ Wide
2	.937″ Wide

BEZEL COLORS	
A	Black
B	White
C	Red
D	Orange
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (MLW3025-F8C-1A):

SERIES MLW ROCKER

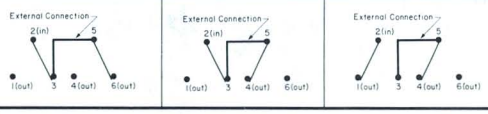


IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

NKK SERIES MLW ROCKER SWITCHES

MINIATURE/SNAP-IN MOUNTED/POWER RATED

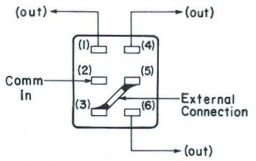
POLES AND CIRCUITS

POLE & THROW	MODEL	ACTUATOR POSITION & TERMINAL NUMBERS ( ) = Momentary — Up	Center	Down
SPDT	MLW3012	ON	NONE	ON
	MLW3013	ON	OFF	ON
	MLW3015	ON	NONE	(ON)
	MLW3018	(ON)	OFF	(ON)
	MLW3019	ON	OFF	(ON)
CONNECTED TERMINALS		2–3	OPEN	2–1
SCHEMATIC				Note: Lamp circuit is isolated & requires an external switch.
DPDT	MLW3022	ON	NONE	ON
	MLW3023	ON	OFF	ON
	MLW3025	ON	NONE	(ON)
	MLW3028	(ON)	OFF	(ON)
	MLW3029	ON	OFF	(ON)
CONNECTED TERMINALS		2–3 5–6	OPEN	2–1 5–4
SCHEMATIC				Note: Lamp circuit is isolated & requires an external switch.
SP3T	MLW3020	ON	ON	ON
With Extra Connection		2–6	2–4	2–1
W/O Extra Connection		2–3 5–6	2–3 5–4	2–1 5–4
SCHEMATIC				

Terminal numbers not actually on switch.

THREE-ON POSITION

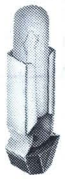
In the manufacture of MLW 3020, a double pole throw switch is converted to a single pole with 3 independent circuits. **The extra connection shown in the diagram must be made during field installation.** Note that terminal numbers are not actually indicated on the switch.



LAMPS

AT602 Incandescent

- **E** 6 Volt
- **F** 12 Volt
- **H** 18 Volt
- **K** 24 Volt
- **L** 28 Volt



Used with Solid and Design Caps

T-1½ Pilot Slide Base

When ordering separately, identify voltage after AT number. For example: AT602-6V.

ELECTRICAL SPECIFICATIONS

Voltage V	6V	12V	18V	24V	28V
Current I	80mA	50mA	35mA	25mA	22mA
Endurance	2,000 Hours				

AT602N Neon

- **N** 110 Volt

T-1½ Pilot Slide Base

Used with Solid and Design Caps

Neon recommended with red caps only.

ELECTRICAL SPECIFICATIONS

Voltage V	110V	Recommended Resistor:
Current I	1.5mA	33K ohms for 110V AC
Endurance	25,000 Hours	100K ohms for 220V AC

AT606 LED

- **D** Single Element

Used with Spot Illuminated Caps

T-1½ Pilot Slide Base

ELECTRICAL SPECIFICATIONS

		Red	Green
Forward Peak Current	I_{FM}	25mA	30mA
Continuous Forward Current	I_F	20mA	25mA
Forward Voltage	V_F	2.8V	2.8V
Reverse Peak Voltage	V_{RM}	4V	4V
Current Reduction Rate Above 25°C	ΔI_F	0.33mA/°C	0.40mA/°C

Electrical specifications are determined at a basic temperature of 25°C. Lamp circuit is independent of switch operation. Dimension drawings of lamps are in the accessories section at the end of this catalog. If the source voltage exceeds the lamp's rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula at the end of the catalog.

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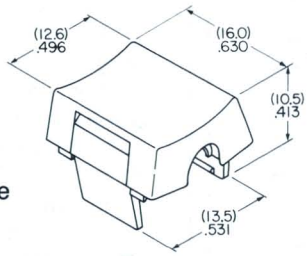
NKK SERIES MLW ROCKER SWITCHES

MINIATURE/SNAP-IN MOUNTED/POWER RATED

CAP TYPES AND COLORS

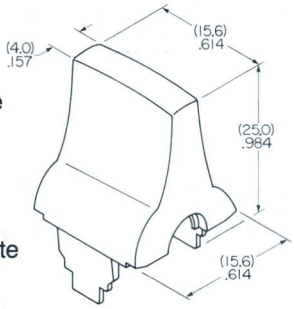
Solid Colored Cap

1 AT405 Rocker



Translucent Polycarbonate

5 AT426 Paddle



Translucent Polycarbonate

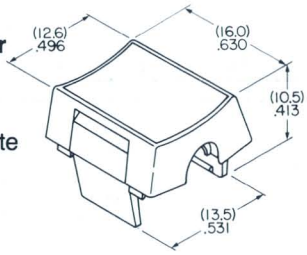
Rocker/Paddle Colors:

- **A** Black
- **B** White
- **C** Red
- **D** Orange
- **E** Yellow
- **F** Green
- **G** Blue

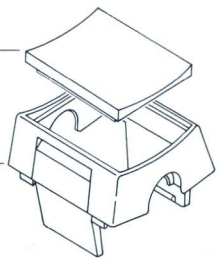
Used with AT602 Incandescent or AT602N Neon Lamps

Design Cap

8 AT438 Rocker



Polycarbonate



Translucent Colored Lens

Opaque Black Rocker

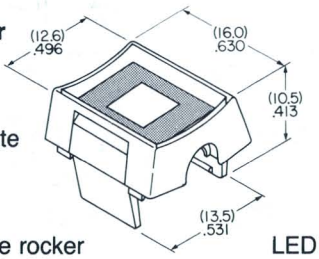
Lens Colors:

- **B** White
- **C** Red
- **D** Orange
- **F** Green
- **G** Blue

Used with AT602 Incandescent or AT602N Neon Lamps

Spot Illuminated Cap

9 AT462 Rocker



Polycarbonate

LED Colors:

- **C** Red
- **F** Green

Black opaque rocker with clear window.

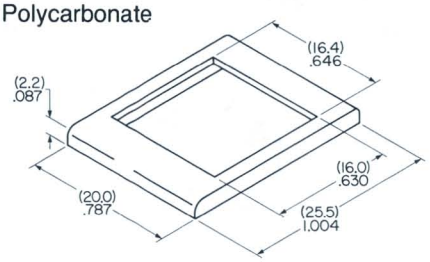
LED AT606 provides illumination color.

Standard finish is glossy. For matte finish, contact factory.

OPTIONAL BEZELS

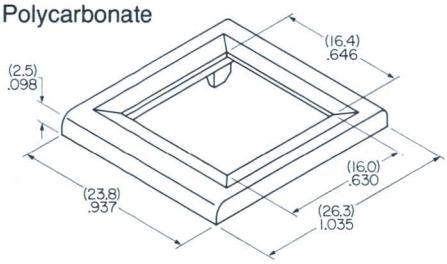
1 AT204 .787″ Wide Bezel (Standard)

Polycarbonate



2 AT9201 .937″ Wide Bezel (Large)

Polycarbonate



Bezel Colors:

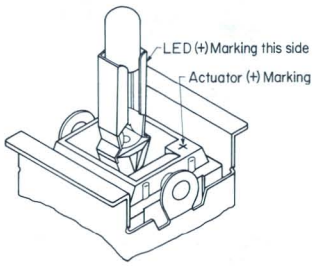
- **A** Black
- **B** White
- **C** Red
- **D** Orange
- **E** Yellow
- **F** Green
- **G** Blue
- **H** Gray

Standard finish is glossy. For matte finish, contact factory.

FRONT PANEL RELAMPING

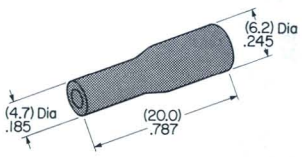
Lamps and LEDs can be changed without removing the switch from the panel. The lamp extractor (AT107) assists in removing and inserting lamps and LEDs.

Note: When changing LEDs, match the positive polarity markings on both lamp base and actuator block.



LAMPING TOOL

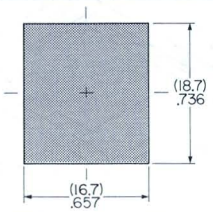
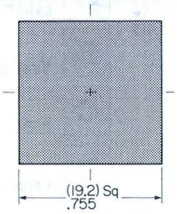
AT107 Lamp Extractor



NKK SERIES MLW ROCKER SWITCHES

MINIATURE/SNAP-IN MOUNTED/POWER RATED

EFFECTIVE PANEL THICKNESSES AND PANEL CUTOUTS

	Without Bezel	With Standard Bezel AT204	With Large Bezel AT9201
Panel Thickness:	1.0 ~ 4.0mm (.039 ~ .157″)	1.0 ~ 3.0mm (.039 ~ .118″)	1.0 ~ 3.0mm (.039 ~ .118″)
Panel Cutout:			

SOLDERING & WIRING

Soldering:

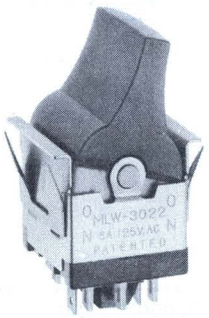
3 seconds at 350°C
5 seconds at 270°C

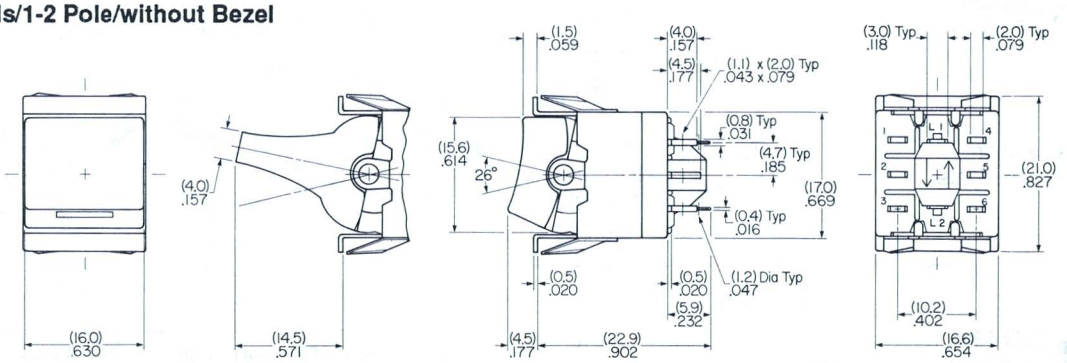
Wiring:

.043″ X .079″ oblong holes accommodate one solid 18-gauge wire or two solid or stranded 22-gauge wires.

Lamp terminals have .047″ diameter holes which accommodate one solid 18-gauge wire.

Solder Lug Terminals/1-2 Pole/without Bezel



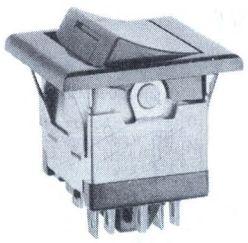


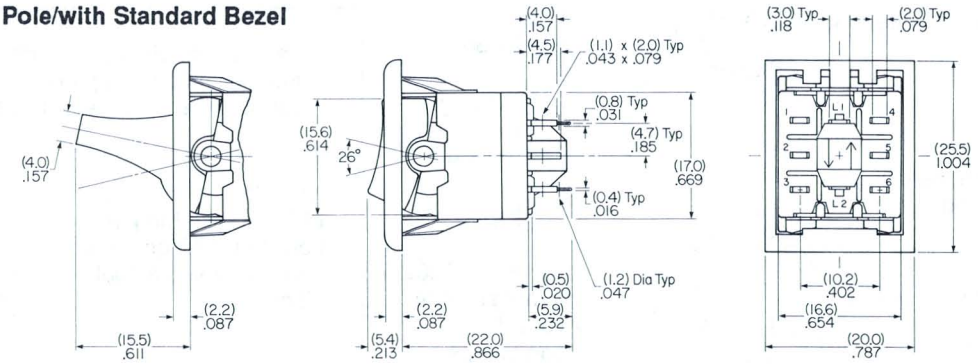
MLW3022-F5C Model Shown

Actuator in UP position.

Terminals 4, 5 & 6 are not on single pole models.

Solder Lug Terminals/1-2 Pole/with Standard Bezel



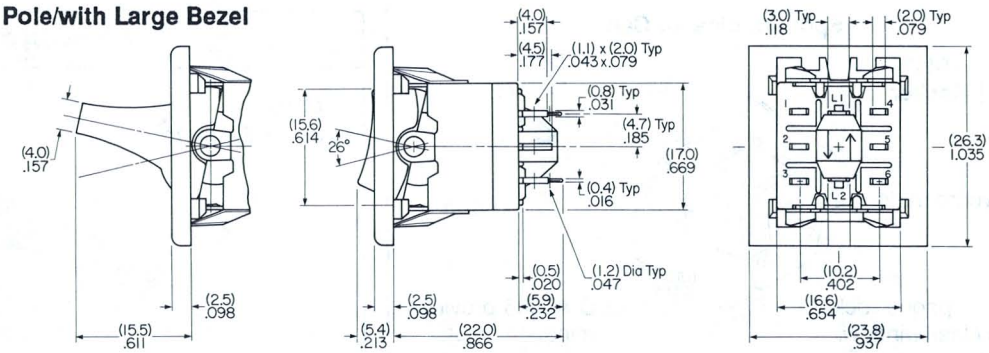


MLW3022-F1C-1A Model Shown

Actuator in UP position.

Terminals 4, 5 & 6 are not on single pole models.

Solder Lug Terminals/1-2 Pole/with Large Bezel



MLW3022-F5C-2A Model Shown

Actuator in UP position.

Terminals 4, 5 & 6 are not on single pole models.

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NKK SERIES MLW INDICATOR

MINIATURE/SNAP-IN MOUNTED

TYPICAL INDICATOR ORDERING EXAMPLE

P01 — F C — 1 A

LAMPS	
Incandescent	
E	6 Volt
F	12 Volt
H	18 Volt
K	24 Volt
L	28 Volt
Neon	
N	110 Volt

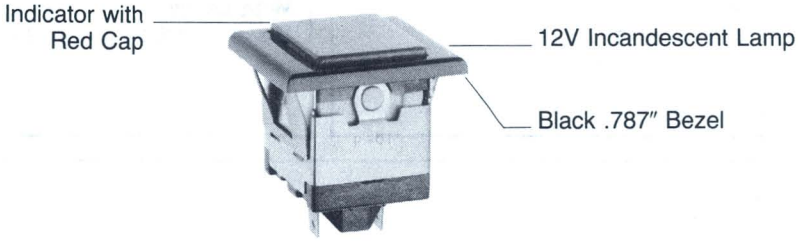
CAP COLORS	
B	White
C	Red
D	Orange
E	Yellow
F	Green
G	Blue

BEZELS	
1	.787″ Wide
2	.937″ Wide

BEZEL COLORS	
A	Black
B	White
C	Red
D	Orange
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (P01-FC-1A):

SERIES MLW INDICATOR

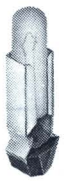


LAMPS

Incandescent

- **E** 6 Volt
- **F** 12 Volt
- **H** 18 Volt
- **K** 24 Volt
- **L** 28 Volt

AT602



T-1½ Pilot Slide Base

Neon

- **N** 110 Volt

AT602N

T-1½ Pilot Slide Base

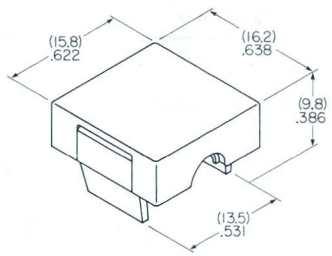
Note: Neon is recommended with red cap only. Electrical specifications appear with the previous MLW switch data.

CAP COLORS

Indicator Cap Colors Available:

- **B** White
- **C** Red
- **D** Orange
- **E** Yellow
- **F** Green
- **G** Blue

AT429



Polycarbonate

Indicator cap finish is glossy.

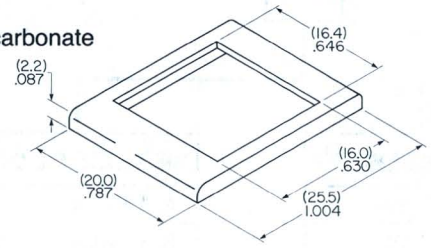
NKK SERIES MLW INDICATOR

MINIATURE/SNAP-IN MOUNTED

OPTIONAL BEZELS

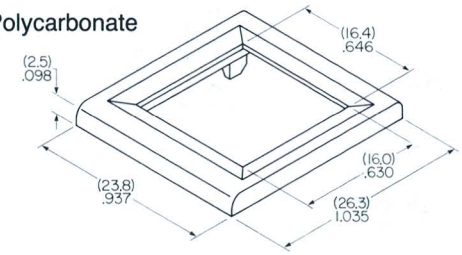
1 **AT204 .787″ Wide Bezel (Standard)**

Polycarbonate



2 **AT9201 .937″ Wide Bezel (Large)**

Polycarbonate

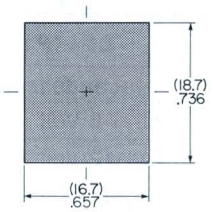
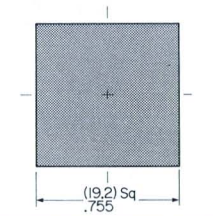


Bezel Colors:

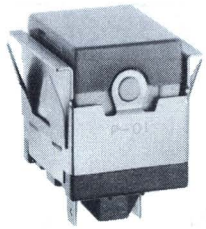
- **A** Black
- **B** White
- **C** Red
- **D** Orange
- **E** Yellow
- **F** Green
- **G** Blue
- **H** Gray

Bezel finish is glossy.

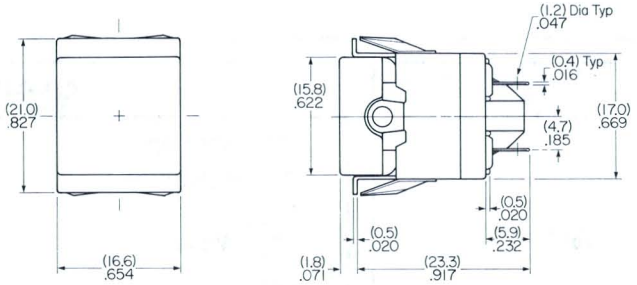
PANEL THICKNESS AND PANEL CUTOUT

	Panel Thickness	Panel Cutout
Without Bezel	1.0 ~ 4.0mm (.039 ~ .157″)	
With Standard Bezel AT204	1.0 ~ 3.0mm (.039 ~ .118″)	
With Large Bezel AT9201	1.0 ~ 3.0mm (.039 ~ .118″)	

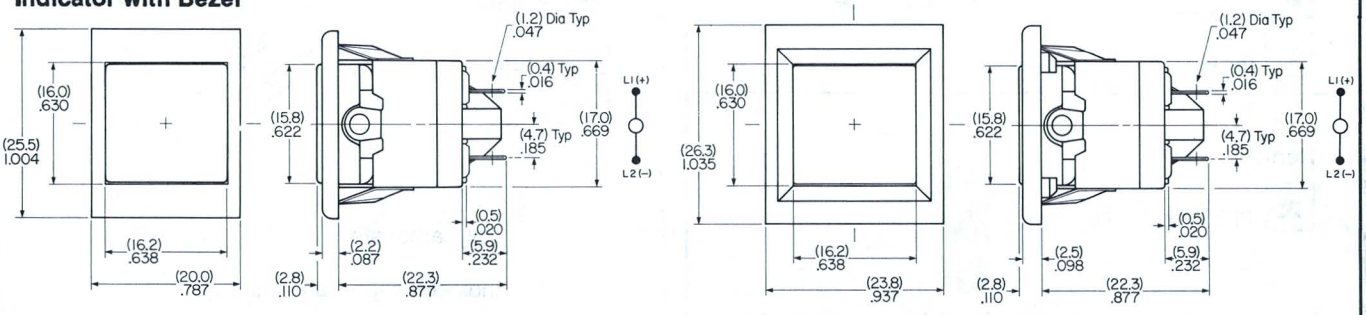
Indicator without Bezel



P01-FC Model Shown



Indicator with Bezel



Standard Bezel

Large Bezel

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NKK SERIES LW

STANDARD SIZE/DUAL LAMPS/SNAP-IN MOUNTED

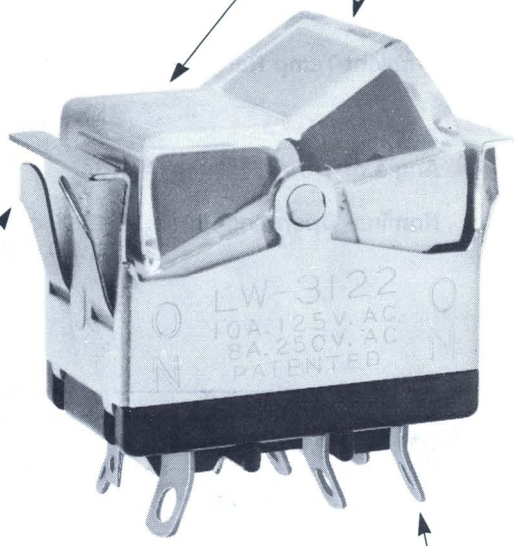
DISTINCTIVE FEATURES

Each half of the rocker face is distinctly illuminated due to partitioned rocker construction and dual lamps.

Selection of colored rocker filters and lamp covers provides numerous lighting combinations.

Snap-in mounting allows fast, easy installation of switch into panel.

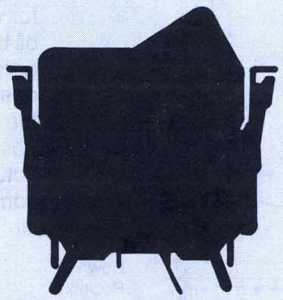
Patented stainless steel retaining clips provide secure mounting over a wider range of panel thicknesses.



Dual incandescent or neon lamps operate independently of each other.

Front panel relamping.

Actual Size



Stationary lamp sockets are independent of rocker actuation, protecting lamps from damage due to shock and vibration.

Switch contacts are rated at 10 amps 125VAC which makes these devices well suited for various power switching applications.

NKK SERIES LW ROCKER SWITCHES

STANDARD SIZE/DUAL LAMPS/SNAP-IN MOUNTED

GENERAL SPECIFICATIONS

Electrical Capacity:	
(Resistive Load)	10A @ 125V AC 6A @ 250V AC 6A @ 30V DC
(Inductive Load)	5A @ 125V AC (P.F. @ .60)
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,500V AC minimum
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	Illuminated: −15°C through +50°C (+5°F through +122°F) Nonilluminated: −15°C through +70°C (+5°F through +158°F)
Angle of Throw:	34°
Nominal Operating Force:	1,200 grams for maintained 1,800 grams for momentary

MATERIALS AND FINISHES

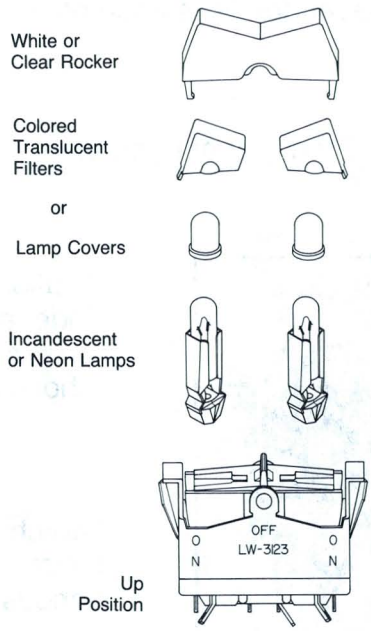
Housing	Steel with chrome plating
Movable Contacts	Silver clad copper
Stationary Contacts	Copper with silver plating
Base	Phenolic resin
Common Terminal	Copper with silver plating
End Terminals	Brass with silver plating
Lamp Terminals	Phosphor bronze with nickel plating

UL RECOGNITION

All devices are recognized by Underwriters Laboratories Inc. for 10A @ 125V AC and 6A @ 250V AC.

UL File No. E44145

SWITCH ASSEMBLY



Various illumination effects may be achieved by using the white or clear rocker with colored filters or lamp covers. Different colors may be selected for each side of the rocker. Select the color desired for both the up and down positions of the actuator and corresponding circuit functions.

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SERIES LW ROCKER SWITCHES

STANDARD SIZE/DUAL LAMPS/SNAP-IN MOUNTED

TYPICAL SWITCH ORDERING EXAMPLE

LW31 2 2 — H 4 C F — A

POLE	
2	DPDT

CIRCUITS			
	Up	Center	Down
2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
( ) = Momentary			

LAMPS	
O	No lamp
Incandescent	
E	6 Volt
F	12 Volt
H	18 Volt
K	24 Volt
L	28 Volt
Neon	
N	110 Volt

ROCKER CAP	
1	White w/o filters or lamp covers
2	White with filters
3	White with lamp covers
4	Clear with filters

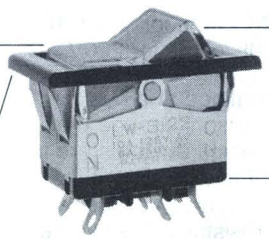
BEZEL	
No Code	No Bezel
A	Black
B	White
C	Red
D	Orange
E	Yellow
F	Green
G	Blue
H	Gray

LAMP COVER/FILTER COLORS FOR UP POSITION	
O	No cover/filter
Lamp Cover	
C	Red
D	Orange
F	Green
Filter	
B	White
C	Red
D	Orange
E	Yellow
F	Green
G	Blue

LAMP COVER/FILTER COLORS FOR DOWN POSITION	
O	No cover/filter
Lamp Cover	
C	Red
D	Orange
F	Green
Filter	
B	White
C	Red
D	Orange
E	Yellow
F	Green
G	Blue

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (LW3122-H4CF-A):

SERIES LW ROCKER



IMPORTANT: Switches are supplied without UL marking unless specified. See Supplement for instructions.

NKK SERIES LW ROCKER SWITCHES

STANDARD SIZE/DUAL LAMPS/SNAP-IN MOUNTED

POLES AND CIRCUITS

POLE & THROW	MODEL	ROCKER POSITION & TERMINAL NUMBER ( ) = Momentary — Up	Center	Down
DPDT	LW3122	ON	NONE	ON
	LW3123	ON	OFF	ON
	LW3125	ON	NONE	(ON)
	LW3128	(ON)	OFF	(ON)
	LW3129	ON	OFF	(ON)
CONNECTED TERMINALS		2–3 5–6	OPEN	2–1 5–4
SCHEMATIC		2 (COMM) 5, 1, 3, 4, 6	L L	Note: Lamp circuit is isolated & requires an external switch.

Terminal numbers not actually on switch.

LAMPS

AT602 Incandescent

- **E** 6 Volt
- **F** 12 Volt
- **H** 18 Volt
- **K** 24 Volt
- **L** 28 Volt

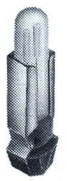
T-1½ Pilot Slide Base

For higher intensity lamp, rated 40mA @ 28V, contact factory.

When ordering separately, identify voltage after AT number. Example: AT602-18V.

AT602N Neon

- **N** 110Volt



T-1½ Pilot Slide Base

Neon not for use with green lamp cover or blue and green filters.

ELECTRICAL SPECIFICATIONS

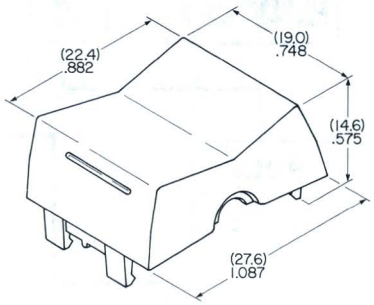
		Incandescent					Neon
Voltage	V	6V	12V	18V	24V	28V	110V
Current	I	80mA	50mA	35mA	25mA	22mA	1.5mA
Endurance	Hours	2,000					25,000

Recommended Resistors for Neon: 33K ohms for 110V AC
100K ohms for 220V AC

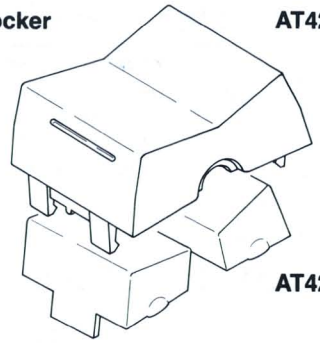
Electrical specifications are determined at a basic temperature of 25°C. Lamp circuit is independent of switch operation. Dimension drawings of lamps are in the accessories section at the end of this catalog. If the source voltage exceeds the lamp's rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula at the end of the catalog.

ROCKER CAP

1 White Rocker without filters or lamp covers — **AT420B**

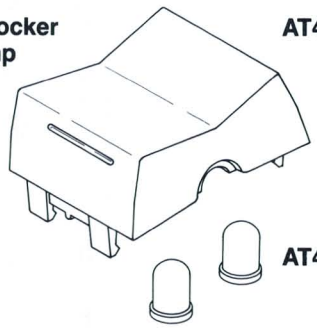


2 White Rocker with filters — **AT420B**



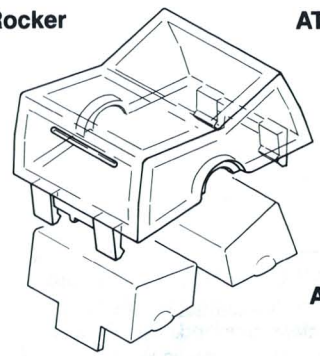
AT421

3 White Rocker with lamp covers — **AT420B**



AT416

4 Clear Rocker with filters — **AT420J**



AT421

AT420B & AT420J are polycarbonate

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NKK SERIES LW ROCKER SWITCHES

STANDARD SIZE/DUAL LAMPS/SNAP-IN MOUNTED

LAMP COVER/FILTER COLORS

Indicate the lamp cover or filter color desired in both the up and down positions.

Color Codes: **Lamp Cover**

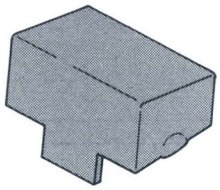
- **C** Red
- **D** Orange
- **F** Green

AT416 Lamp Cover

Silicon Rubber

Color Codes: **Rocker Filter**

- **B** White
- **C** Red
- **D** Orange
- **E** Yellow
- **F** Green
- **G** Blue

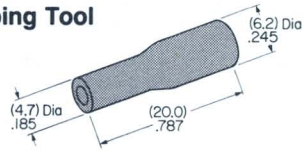


AT421 Filter

Polycarbonate

LAMPING TOOL

AT107 Lamping Tool



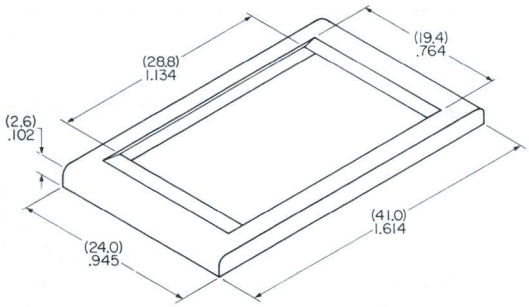
Lamps can be changed without removing the switch from the panel. AT107 assists in removing lamps from the switch.

OPTIONAL BEZEL

Color Codes:

- **A** Black
- **B** White
- **C** Red
- **D** Orange
- **E** Yellow
- **F** Green
- **G** Blue

AT206 Bezel



Polycarbonate

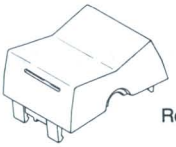
SOLDERING & WIRING

Soldering Time & Temperature Limits:
3 seconds at 350°C 5 seconds at 270°C

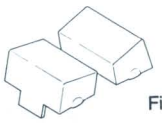
Wiring Specifications:
Each power terminal hole is .079″ × .102″ oblong which accommodates one solid or stranded 14-gauge wire or two 18-gauge wires.
Each lamp terminal hole is .047″ diameter and accommodates one solid 18-gauge wire.

INSCRIPTIONS

Inscriptions can be placed on the rocker, filter or a film inserted between the two. Details regarding hot stamping or engraving may be obtained from the factory.

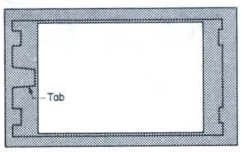

Rocker

Film


Filter

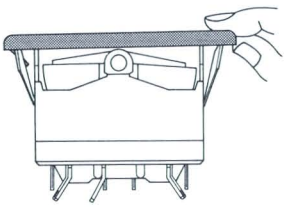
BEZEL ASSEMBLY

To attach bezel:

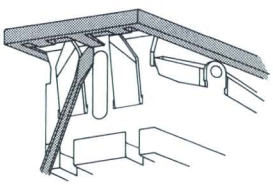


1. Pry out tab on bezel to a 45° angle.

2. Insert switch frame under tab and snap on bezel.



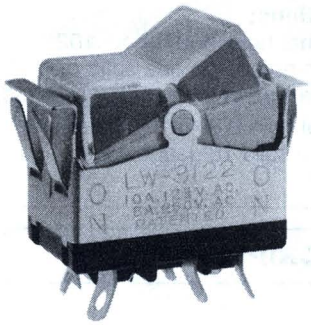
3. Push tab back into place.

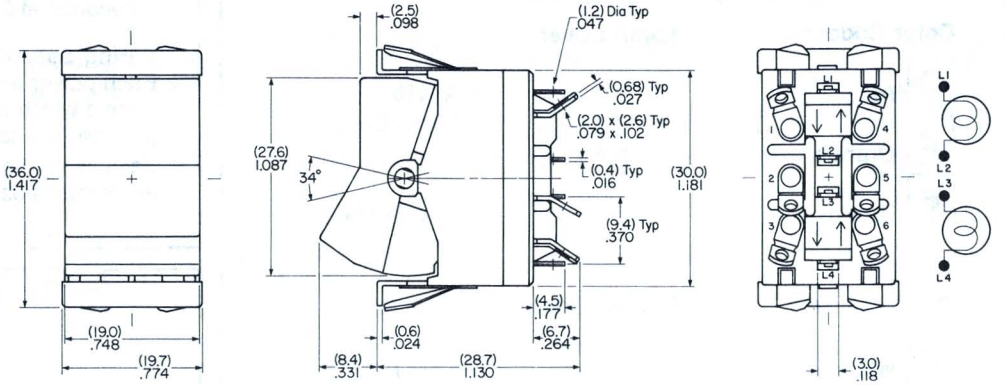


NKK SERIES LW ROCKER SWITCHES

STANDARD SIZE/DUAL LAMPS/SNAP-IN MOUNTED

Solder Lug/Double Pole/without Bezel

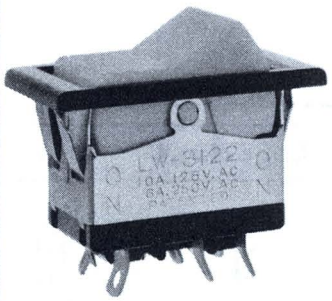


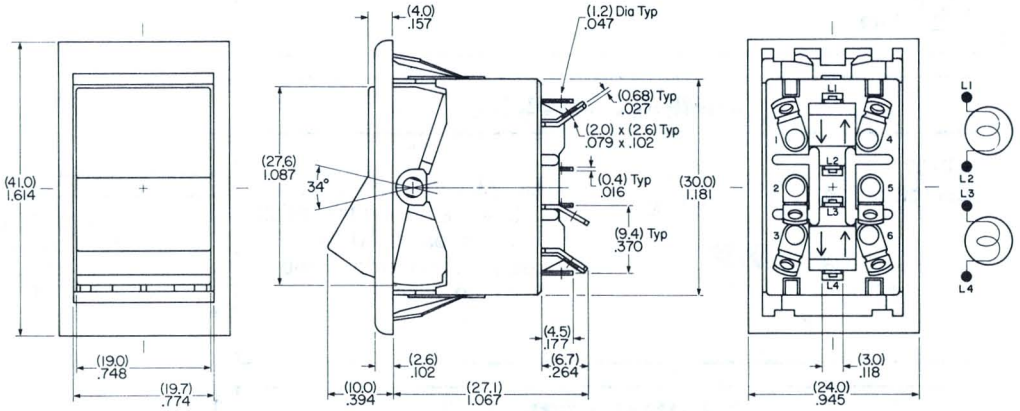


LW3122-F4CF Model Shown

Actuator in UP position.

Solder Lug/Double Pole/with Bezel



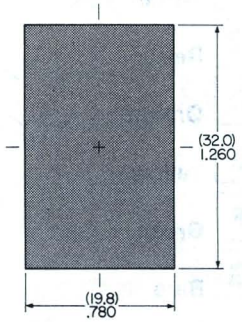


LW3122-F3CF-A Model Shown

Actuator in UP position.

EFFECTIVE PANEL THICKNESS AND PANEL CUTOUT

	Without Bezel	With Bezel	Panel Cutout:
Panel Thickness:	1 ~ 4mm (.039 ~ .157″)	1 ~ 3mm (.039 ~ .118″)	



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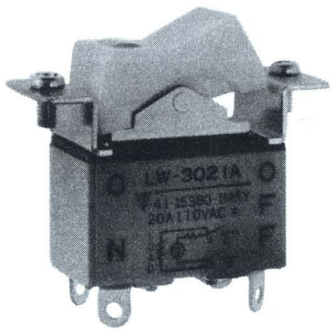
NKK SERIES LW

STANDARD SIZE/PANEL MOUNTED/HIGH CAPACITY

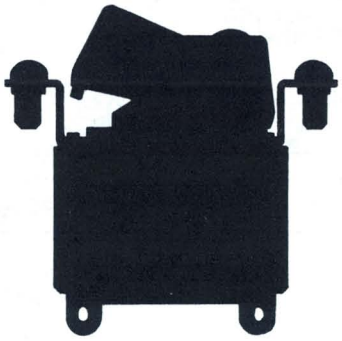
LIGHTED POWER ROCKER

LW3021A



The lighted power rocker completes the LW Series. This device is single pole, single throw with double break contacts. These switches come assembled with a neon lamp which contains a built-in resistor. The rocker is white with a red translucent window for spot illumination. The device has a two screw, flush panel mounting frame.

Actual Size



GENERAL SPECIFICATIONS

Electrical Capacity: (Resistive Load)	20A @ 110V AC
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Ambient Temp Range:	−10°C through +50°C (+14°F through +122°F)
Angle of Throw:	22°
Nominal Operating Force:	1,250 grams

MATERIALS AND FINISHES

Rocker	Polycarbonate resin
Mounting Frame	Steel with chrome plating
Movable Contacts	Silver alloy
Stationary Contacts	Copper with silver plating
Base	Phenolic resin
Common Terminal	Brass with silver plating
End Terminals	Brass with silver plating

PART NUMBER BREAKDOWN

LW30 2 1 A

POLES

2	SPST Double Break

CONTACT RATING

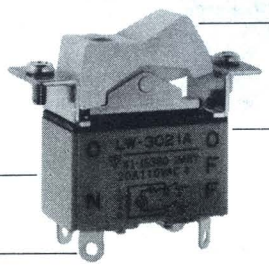
A	20A High Capacity

CIRCUITS

1	ON	NONE	OFF

PART NUMBER BREAKDOWN (LW3021A):

SERIES LW ROCKER



- Lighted Rocker with Neon Lamp
- 20 Amp High Capacity Rating
- SPST ON-NONE-OFF Circuit
- Solder Lug Terminals

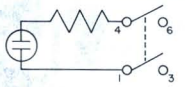
NKK SERIES LW ROCKER SWITCHES

STANDARD SIZE/PANEL MOUNTED/HIGH CAPACITY

POLES AND CIRCUITS

POLE & THROW	MODEL	ROCKER POSITION & TERMINAL NUMBERS Up	Center	Down
SPST	LW3021A	ON	NONE	OFF
CONNECTED TERMINALS		1-3 4-6	OPEN	OPEN

SCHEMATIC



Terminal numbers are on the switch.

NEON LAMP SPECIFICATIONS

A neon lamp with built-in ballast resistor is supplied as an integral part of the switch.

Voltage	V	90–120V AC
Internal Series Resistance		100K ohms
Current	I	0.8mA
Endurance		10,000 hours average

SOLDERING & WIRING

Soldering Time & Temperature Limits:

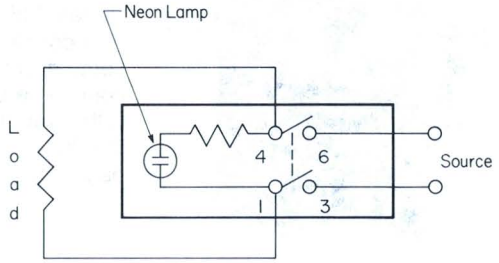
3 seconds at 350°C 5 seconds at 270°C

Wiring Specifications:

The .094″ diameter holes accommodate one solid or stranded 12-gauge wire or two solid or stranded 20-gauge wires.

INTERNAL WIRING DIAGRAM

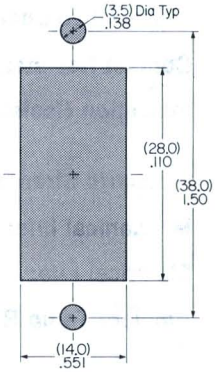
Since this is a double break device, one side of the electrical source should be connected to terminal 3 and the other side to terminal 6. The electrical load should be connected between terminals 1 and 4.



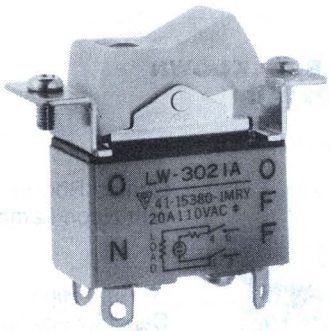
MOUNTING DETAILS

Panel Cutout:

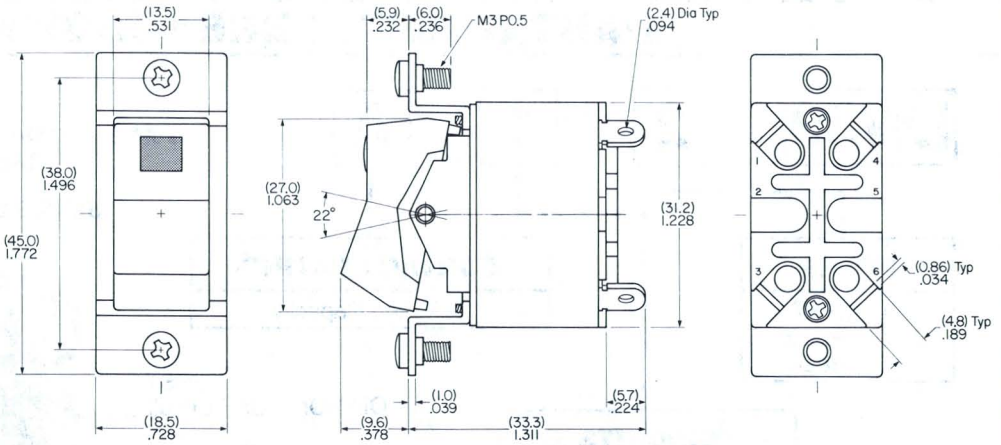
This device accommodates a maximum panel thickness of 5mm (.197″). Two screws for flush panel mounting are supplied with the switch.



Solder Lug Terminals/Single Pole



LW3021A Model Shown



Actuator in UP position.

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NKK SERIES M21

SUBMINIATURE/LED TIPPED ACTUATORS

DISTINCTIVE FEATURES

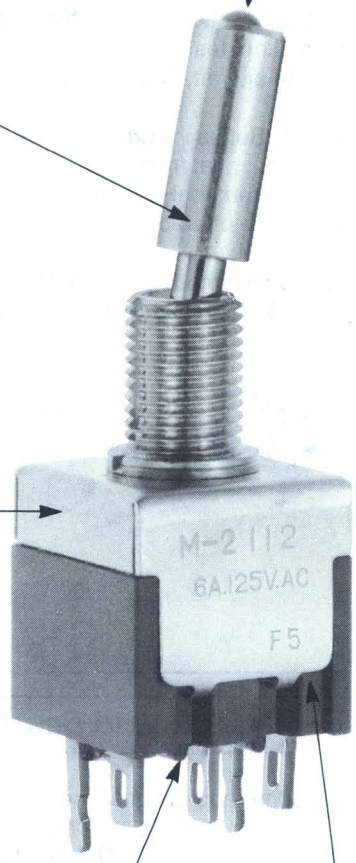
With the LED located in the tip of the toggle and the paddle, NKK has achieved an industry first. Single and bicolor LED illumination is offered in toggles, rockers, and paddles with synchronous and isolated LED circuits.

Toggle switches are internally constructed with an antijamming feature which protects the contacts from damage due to excessive downward force on the toggle.

The high torque bushing prevents the bushing from rotating or separating from the metal frame during installation.

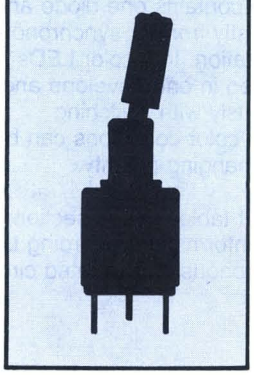
The stainless steel frame resists corrosion.

6 amp rated patented silver contacts are of specially composed alloy for hardness.



Insulating barriers, higher than standard, protect against crossover.

Actual Size



Terminals are epoxy sealed to lock out flux, dust, and other contaminants.

1500V dielectric strength between switch contacts and case is accomplished by clinching the frame away from the terminals.

NKK SERIES M21

SUBMINIATURE/LED TIPPED ACTUATORS

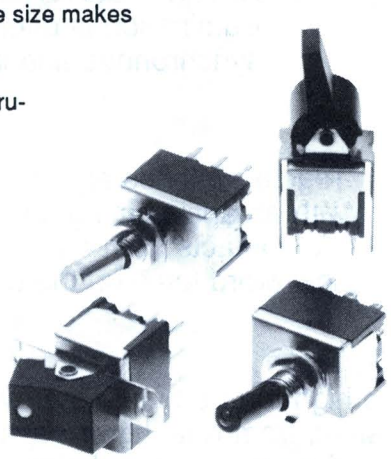
APPLICATION DATA

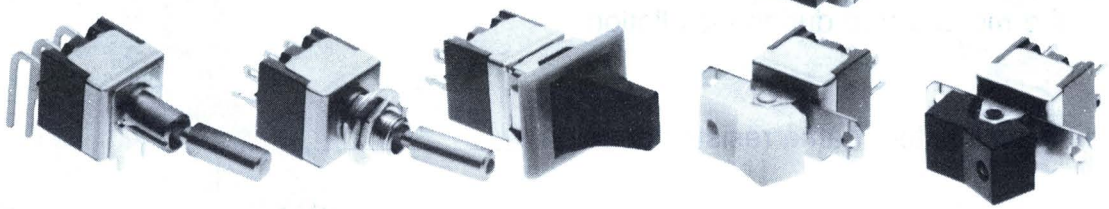
LED illumination at the tip of the actuators is a design accomplishment unique in the industry. With this feature there is strong, concentrated light emission usable in low light environments and a clearly visible indication of switch status. Subminiature size makes M2100 devices well suited to limited space requirements.

Popular applications in which the switches can be used include instrumentation, test apparatus, radio and TV studio control consoles, private aircraft, and telecommunication equipment.

M2100 Series includes toggles, rockers, and paddles with bushing, snap-in, or flat frame mountings and solder lug, quick connect, and PC terminal options. Three circuit variations, including 3-ON, are offered.

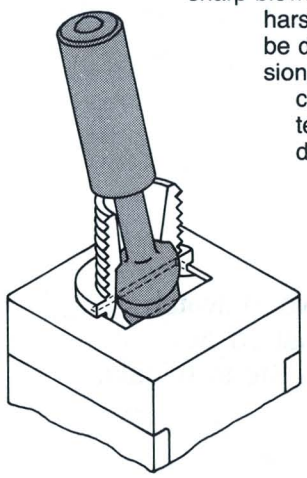
Single pole models are UL Recognized (UL File No. E44145) and CSA Certified (File Nos. LR23535 & LR56017).





ANTIJAMMING DESIGN

In some applications where a lever may suffer sharp blows or be subjected to other harsh treatment, contacts can be deformed by the transmission of downward force to the contact mechanism. Protection against mechanism damage is designed into the M2100 Series toggle switches. Beneath the toggle joint is a step which rests against the frame of the switch. When downward force is applied to the lever, the frame and step resist movement of the lever and protect the contact mechanism.



LED OPERATION

The light emitting diode (LED) has the ideal characteristics of being small, durable, and suited to rapid switching. Single and bicolor LEDs of red, yellow, and green are offered in the M2100 Series.

A single color LED contains one diode and can operate independently from or synchronously with switching operation. In bicolor LEDs two diodes are contained in one envelope and operate synchronously with switching operation. Reverse color conditions can be accomplished by changing polarity.

The pole and circuit tables in this section present additional information regarding LED illumination, synchronous and isolated circuits, reversing colors, etc.

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NKK SERIES M2100 SWITCHES

SUBMINIATURE/LED TIPPED ACTUATORS

GENERAL SPECIFICATIONS

Electrical Capacity:
(Resistive Load)
For Silver Contacts: 6A @ 125V AC; 3A @ 250V AC; 3A @ 30V DC
For Gold contacts: 0.4VA maximum @ 28V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)

Contact Resistance: 10 milliohms maximum

Insulation Resistance: 1,000 megohms minimum @ 500V DC

Dielectric Strength:
1,000V AC minimum between contacts
1,500V AC minimum between contacts and case

Mechanical Life: 50,000 operations minimum

Electrical Life: 25,000 operations minimum

Ambient Temp. Range:
-10°C through +55°C (+14°F through +131°F) for toggles & rockers
-25°C through +70°C (-13°F through +158°F) for paddles

Angle of Throw: 20°

Nominal Operating Force:

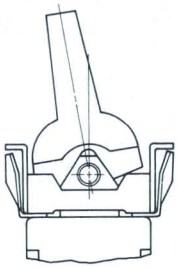
	Single Pole	Double Pole
Toggles & Paddles		
ON to ON position	325 grams	450 grams
OFF to ON position	400 grams	720 grams
Rockers		
ON to ON position	650 grams	1400 grams
OFF to ON position	1000 grams	1800 grams

MATERIALS & FINISHES

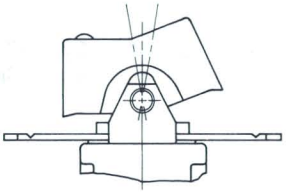
Bushing	Brass with nickel plating
Housing	Stainless steel
Mounting Bracket	Steel with tin plating
Movable Contacts	Silver alloy or silver alloy with gold plating over nickel
Stationary Contact	Silver with silver plating or gold plating over nickel
Lamp Contacts	Phosphor bronze
Base	Glass fiber reinforced diallylphthalate (UL-94V-0)
Power Terminals	Copper with silver or gold plating
Lamp Terminals	Copper with silver or gold plating

MOUNTING METHODS

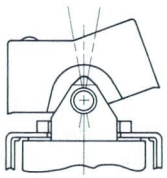
Bushing for Toggle



Snap-in for Paddle



Flat Frame for Rocker



Bracket for Rocker or Paddle

NKK SERIES M2100 SWITCHES

SUBMINIATURE/LED TIPPED ACTUATORS

TYPICAL TOGGLE & ROCKER SWITCH ORDERING EXAMPLE

M21 2 3 N CF W 01

POLES	
1	SPDT
2	SP3T DPDT

CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON
0	ON	ON	ON
3-ON not standard			

LED CIRCUITS & ACTUATOR TYPES	
Synchronous	
T	Toggle with Bushing Mounting
N	Rocker with Flat Frame or Bracket Mounting
Isolated	
L	Toggle with Bushing Mounting
R	Rocker with Flat Frame or Bracket Mounting

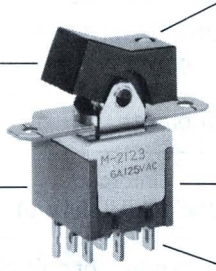
LED COLORS	
Single Color	
C	Red
E	Yellow
F	Green
Bicolor	
CE	Red/Yellow
CF	Red/Green
EF	Yellow/Green
Red/Green is standard.	

CONTACT MATERIAL & RATING	
W	Silver 6A @ 125V AC
G	Gold 0.4VA @ 28V AC/DC

TERMINALS	
01	Solder Lug
02	Quick Connect
03	Straight PC
13	Straight PC with Bracket (for SP rocker switch only)
30	Right Angle PC (for SP toggle switch only)

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2123NCFW01):

SERIES M2100 ROCKER



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

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NKK SERIES M2100 SWITCHES

SUBMINIATURE/LED TIPPED ACTUATORS

TYPICAL PADDLE SWITCH ORDERING EXAMPLE

M21	1	2	P	E	W	02	—	E

POLES	
1	SPDT

CIRCUITS			
2	ON	NONE	ON
3	ON	OFF	ON

LED COLORS	
Single Color	
C	Red
E	Yellow
F	Green
Bicolor	
CF	Red/Green

BEZEL COLORS	
For Snap-in Mount	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

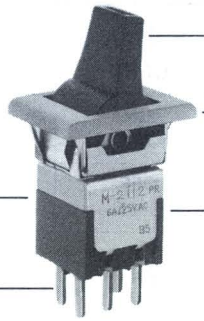
LED CIRCUITS & ACTUATOR TYPES	
Synchronous	
J	Paddle with Snap-in or Bracket Mounting
Isolated	
P	Paddle with Snap-in or Bracket Mounting

CONTACT MATERIAL & RATING	
W	Silver 6A @ 125V AC
G	Gold 0.4VA @ 28V AC/DC

TERMINALS	
For Snap-in Mount	
01	Solder Lug
02	Quick Connect
03	Straight PC
For Bracket Mount Only	
13	Straight PC with Bracket (for SP switch only)

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (M2112PEW02-E):

SERIES M2100 PADDLE



Isolated LED Circuit in Paddle Actuator

DPDT ON-NONE-ON Switch Circuit

Quick Connect Terminals

Yellow Single Color LED

Yellow Bezel

Silver Contacts

IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

NKK SERIES M2100 SWITCHES

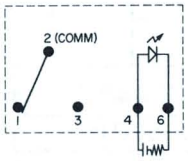
SUBMINIATURE/LED TIPPED ACTUATORS

POLES & CIRCUITS & LED ILLUMINATION

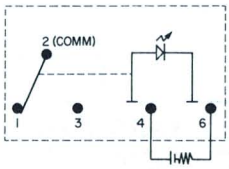
POLE & THROW	MODEL	ACTUATOR POSITION & TERMINAL NUMBERS: Down	Center	Up
SPDT	**M2112**	ON	NONE	ON
CONNECTED POWER TERMINALS		2–3	NONE	2–1
LED CIRCUITS — **ISOLATED SINGLE COLOR** CONNECTED TERMINALS		ON 4–6	NONE NONE	ON 4–6
LED CIRCUITS — **SYNCHRONOUS SINGLE COLOR** CONNECTED TERMINALS		ON 4–6	NONE NONE	OFF OPEN
LED CIRCUITS — **SYNCHRONOUS BICOLOR** CONNECTED TERMINALS		RED RED YELLOW 5–6	NONE NONE	GREEN YELLOW GREEN 5–4
SPDT	**M2113**	ON	OFF	ON
CONNECTED POWER TERMINALS		2–3	OPEN	2–1
LED CIRCUITS — **ISOLATED SINGLE COLOR** CONNECTED TERMINALS		ON 4–6	ON 4–6	ON 4–6
LED CIRCUITS — **SYNCHRONOUS SINGLE COLOR** CONNECTED TERMINALS		ON 4–6	OFF OPEN	ON 4–6
LED CIRCUITS — **SYNCHRONOUS BICOLOR** CONNECTED TERMINALS		RED RED YELLOW 5–6	OFF OPEN	GREEN YELLOW GREEN 5–4
DPDT	**M2122**	ON	NONE	ON
CONNECTED POWER TERMINALS		2–3 5–6	NONE	2–1 5–4
LED CIRCUITS — **ISOLATED SINGLE COLOR** CONNECTED TERMINALS		ON 7–9	NONE NONE	ON 7–9
LED CIRCUITS — **SYNCHRONOUS SINGLE COLOR** CONNECTED TERMINALS		ON 7–9	NONE NONE	OFF OPEN
LED CIRCUITS — **SYNCHRONOUS BICOLOR** CONNECTED TERMINALS		RED RED YELLOW 8–9	NONE NONE	GREEN YELLOW GREEN 8–7
DPDT	**M2123**	ON	OFF	ON
CONNECTED POWER TERMINALS		2–3 5–6	OPEN	2–1 5–4
LED CIRCUITS — **ISOLATED SINGLE COLOR** CONNECTED TERMINALS		ON 7–9	ON 7–9	ON 7–9
LED CIRCUITS — **SYNCHRONOUS SINGLE COLOR** CONNECTED TERMINALS		ON 7–9	OFF OPEN	ON 7–9
LED CIRCUITS — **SYNCHRONOUS BICOLOR** CONNECTED TERMINALS		RED RED YELLOW 8–9	OFF OPEN	GREEN YELLOW GREEN 8–7

SCHEMATICS

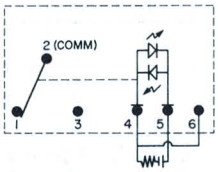
ISOLATED SINGLE COLOR LED



SYNCHRONOUS SINGLE COLOR LED

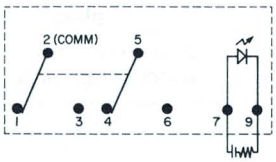


SYNCHRONOUS BICOLOR LED

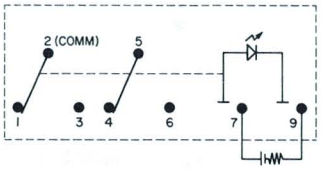


A reverse color condition can be obtained by connecting positive to terminals 4 & 6 and negative to terminal 5.

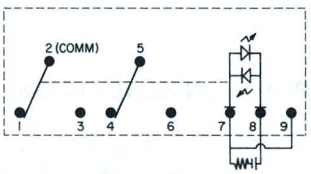
ISOLATED SINGLE COLOR LED



SYNCHRONOUS SINGLE COLOR LED



SYNCHRONOUS BICOLOR LED



A reverse color condition can be obtained by connecting positive to terminals 7 & 9 and negative to terminal 8.

Terminal numbers are not actually on the switch.

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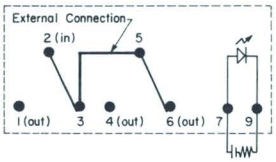
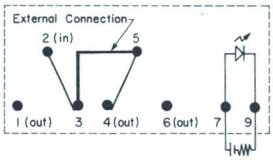
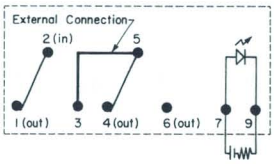
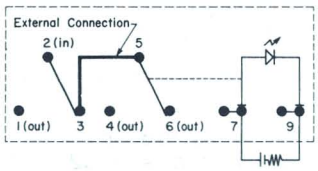
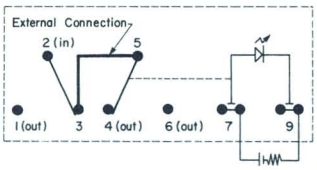
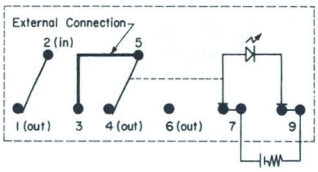
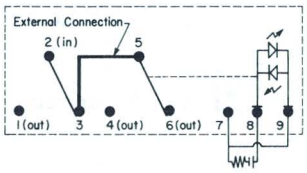
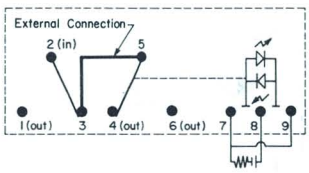
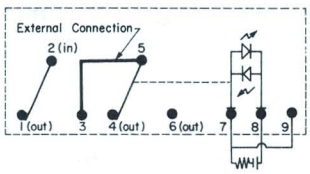
NKK SERIES M2100 SWITCHES

SUBMINIATURE/LED TIPPED ACTUATORS

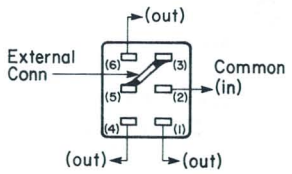
SINGLE POLE WITH 3-ON CIRCUIT & LED ILLUMINATION

POLE & THROW	MODEL	ACTUATOR POSITION & TERMINAL NUMBERS		
		Down	Center	Up
SP3T	M2120	ON	ON	ON
CONNECTED POWER TERMINALS		2–3 5–6	2–3 5–4	2–1 5–4
LED CIRCUITS — ISOLATED SINGLE COLOR CONNECTED TERMINALS		ON 7–9	ON 7–9	ON 7–9
SCHEMATICS FOR ISOLATED SINGLE COLOR				
SYNCHRONOUS SINGLE COLOR CONNECTED TERMINALS		ON 7–9	OFF OPEN	ON 7–9
SCHEMATICS FOR SYNCHRONOUS SINGLE COLOR				
SYNCHRONOUS BICOLOR CONNECTED TERMINALS		RED RED YELLOW 8–9	OFF OPEN	GREEN YELLOW GREEN 8–7
SCHEMATICS FOR SYNCHRONOUS BICOLOR				

A reverse color condition can be obtained by connecting positive to terminals 7 & 9 and negative to terminal 8.

THREE-ON POSITIONS

In the manufacture of the M2120 model, a double pole double throw switch is converted to a single pole with 3 independent circuits. **The extra connection shown in the diagram must be made during field installation.** Note that terminal numbers are not actually indicated on the switch.



NKK SERIES M2100 SWITCHES

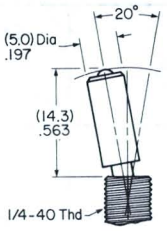
SUBMINIATURE/LED TIPPED ACTUATORS

LED CIRCUIT, ACTUATOR & MOUNTING TYPE COMBINATIONS

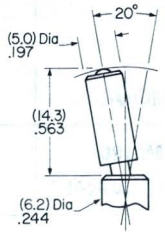
T **Toggle with Synchronous LED Circuit**

L **Toggle with Isolated LED Circuit**

Brushed aluminum standard finish.
Black & bright finish available on request.



Threaded Bushing supplied with Terminals 01, 02, & 03

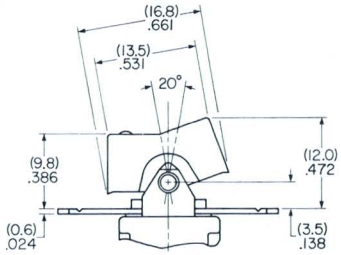


Smooth Bushing supplied with Terminal 30

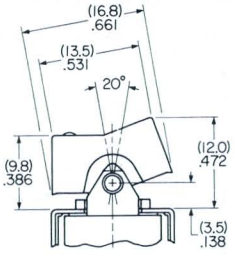
N **Rocker with Synchronous LED Circuit**

R **Rocker with Isolated LED Circuit**

Polycarbonate
Black standard; other colors available on request.



Flat Frame supplied with Terminals 01, 02, & 03



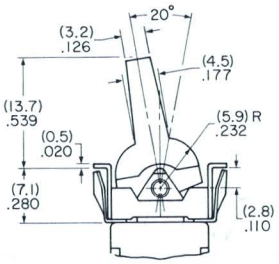
Bracket supplied with Terminal 13

J **Paddle with Synchronous LED Circuit**

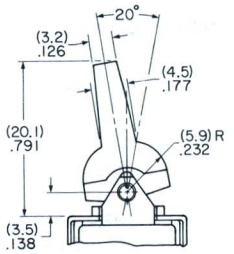
P **Paddle with Isolated LED Circuit**

Polycarbonate
Black standard; other colors available on request.

Bezel AT207, shown in the accessories section at the end of this catalog, is available for use with snap-in mounted paddle models.



Snap-in supplied with Terminals 01, 02, & 03



Bracket supplied with Terminal 13

LEDS

LED Color Codes: **C** Red **E** Yellow **F** Green
Colors available for Toggles & Rockers: C, E, F, CE, CF, & EF. Colors available for Paddles: C, E, F, & CF
Red/Green is standard for bicolor. Electrical specifications shown in the Supplement at the end of this catalog.

CONTACTS & RATINGS

W **Silver**

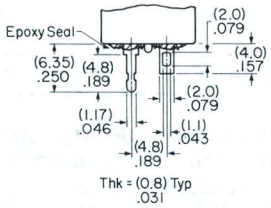
6A @ 125V AC
3A @ 250V AC

G **Gold**

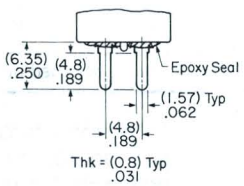
0.4VA maximum
@ 28V AC/DC

TERMINALS

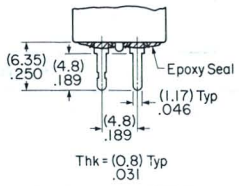
01 **Solder Lug**



02 **Quick Connect**



03 **Straight PC**



13 **Straight PC with Bracket**

30 **Right Angle PC**

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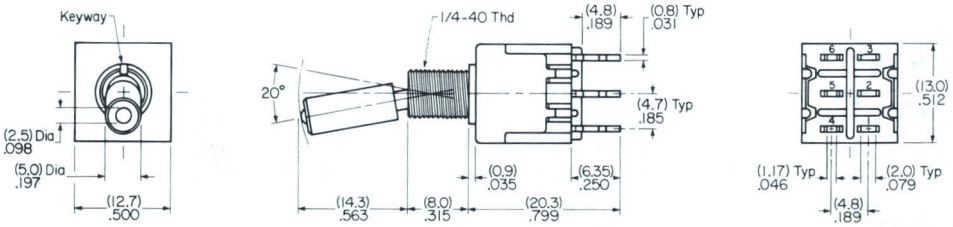
NKK SERIES M2100 SWITCHES

SUBMINIATURE/LED TIPPED ACTUATORS

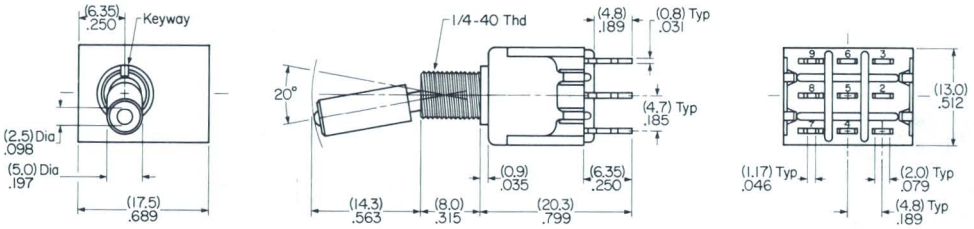
Toggle/Solder Lug Terminals/Single Pole



M2112TCFW01 Model Shown

For single color LED switch, terminal 5 is omitted.

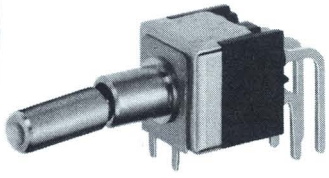
Toggle/Solder Lug Terminals/Double Pole

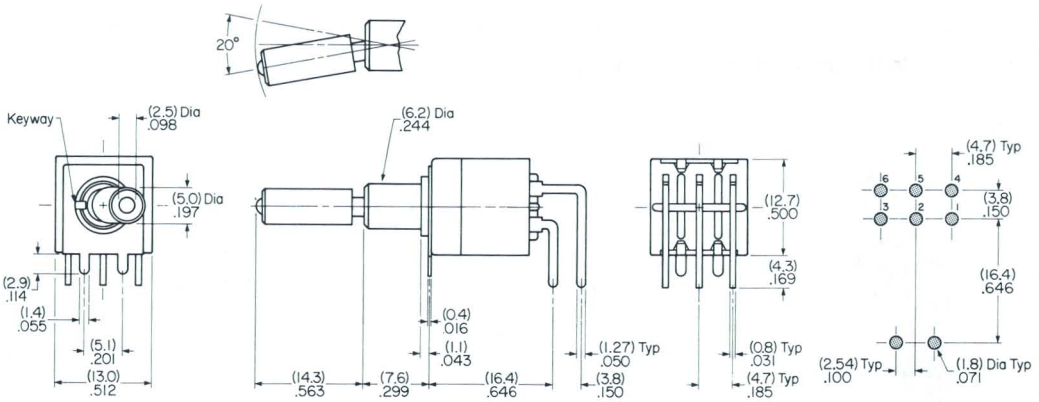


M2122TCFW01 Model Shown

For single color LED switch, terminal 8 is omitted.

Toggle/Right Angle PC Terminals/Single Pole





M2112TCFG30 Model Shown

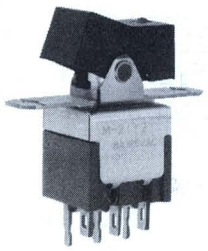
For single color LED switch, terminal 5 is omitted.

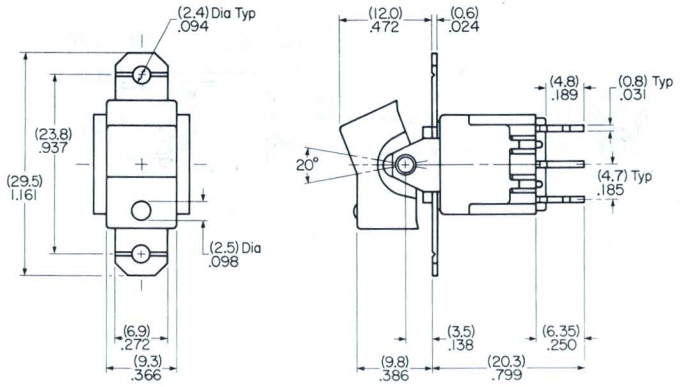
This device is available in single pole only and in two circuits (M2112 ☐☐☐ G30 and M2113 ☐☐☐ G30). These models have right angle PC terminals with a smooth bushing. Gold contact material is standard. Synchronous or isolated LED circuits with a toggle actuator (T or L LED circuit/actuator codes) are supplied.

NKK SERIES M2100 SWITCHES

SUBMINIATURE/LED TIPPED ACTUATORS

Rocker/Solder Lug Terminals/Single Pole

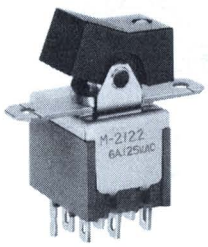


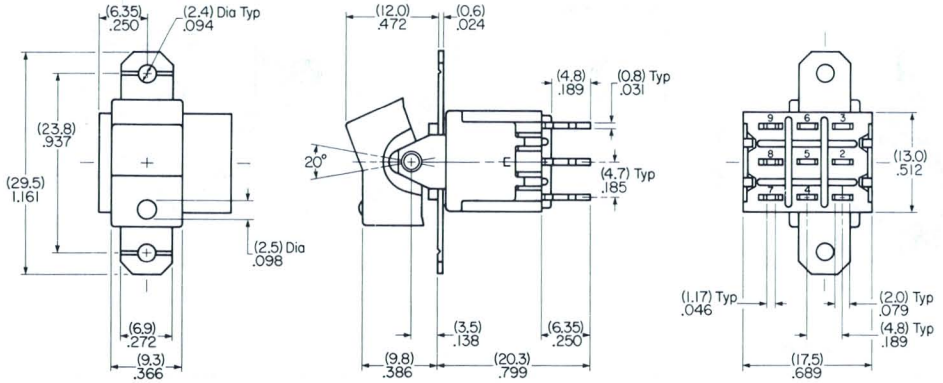


M2112NCFW01 Model Shown

For single color LED switch,
terminal 5 is omitted.

Rocker/Solder Lug Terminals/Double Pole

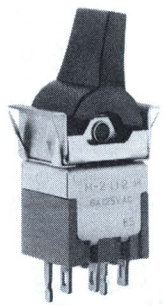


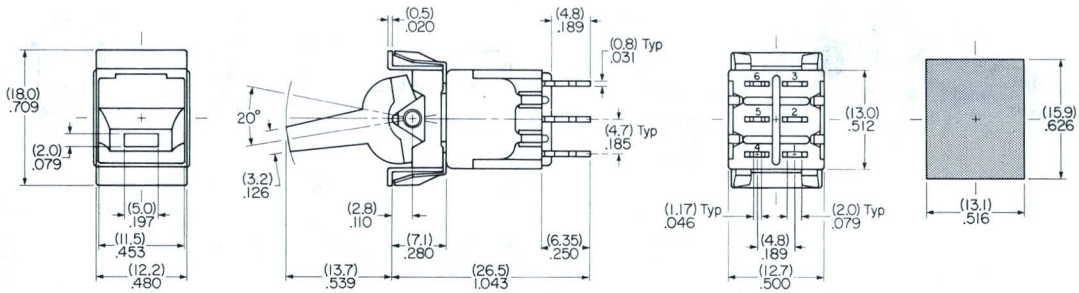


M2122NCFW01 Model Shown

For single color LED switch,
terminal 8 is omitted.

Paddle/Solder Lug Terminals/Single Pole





M2112JCFW01 Model Shown

Panel Thickness: 1 ~ 3.2mm (.039" ~ .126") without Bezel
1 ~ 2.5mm (.039" ~ .098") with Bezel

For single color LED switch,
terminal 5 is omitted.

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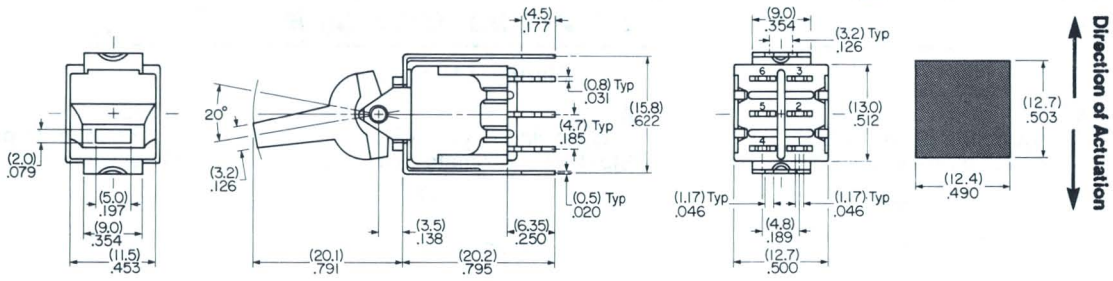
NKK SERIES M2100 SWITCHES

SUBMINIATURE/LED TIPPED ACTUATORS

Paddle/Straight PC Terminals with Bracket/Single Pole

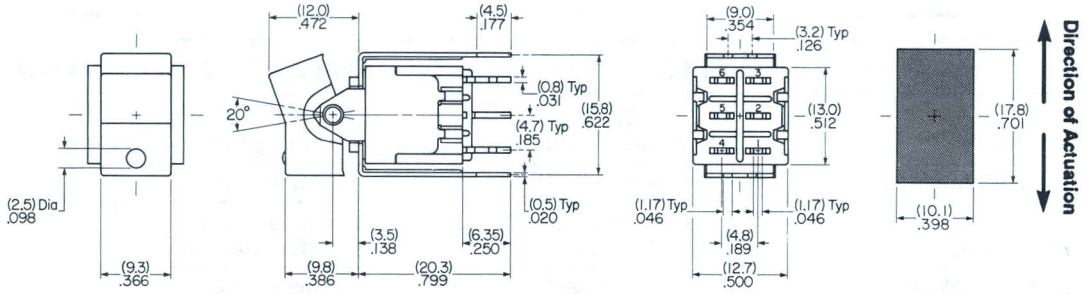


M2112JCFW13 Model Shown

For single color LED switch, terminal 5 is omitted.

This device is available in single pole only and in two circuits (M2112 ☐☐☐W13 & M2113 ☐☐☐W13). These models have a bracket to increase mounting stability of the straight PC terminals. Silver contact material is standard with these devices, which are supplied in synchronous or isolated LED circuits with a paddle actuator (J or P LED circuit/actuator codes).

Rocker/Straight PC Terminals with Bracket/Single Pole



M2112NCFW13 Model Shown

For single color LED switch, terminal 5 is omitted.

This device is available and in two circuits (M2112 ☐☐☐W13 & M2113 ☐☐☐W13). These models have a bracket to increase mounting stability of the straight PC terminals. Silver contact material is standard with these devices, which are supplied in synchronous or isolated LED circuits with a rocker actuator (N or R LED circuit/actuator codes).

NKK SERIES M2100 SWITCHES

SUBMINIATURE/LED TIPPED ACTUATORS

WIRING & SOLDERING

Solder lug terminals have a .043" x .079" oval hole which accommodates 1 solid 18-gauge wire or 2 solid or stranded 20-gauge wires.

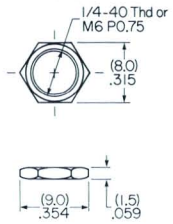
SOLDERING LIMITS

The soldering time and temperature limits are
3 seconds at 350°C
5 seconds at 270°C.

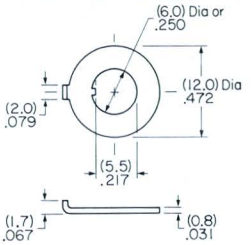
MOUNTING HARDWARE

Standard Hardware

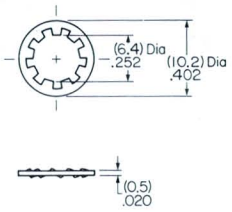
AT513
Hexagon nuts (2 per switch)
Brass with nickel plating



AT507
Locking ring (1 per switch)
Steel with chromate over zinc



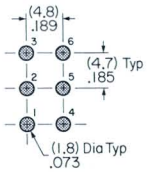
AT509
Lockwasher (1 per switch)
Steel with chromate over zinc



Optional Hardware: Knurled nuts, dress nuts, and ON-OFF plates are available.

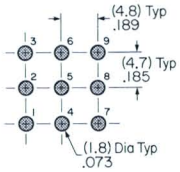
PCB MOUNTING

Straight PC Single Pole



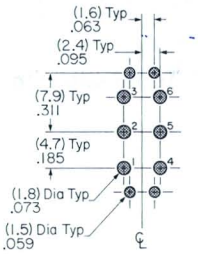
For single color LED switch, terminal 5 is omitted.

Straight PC Double Pole



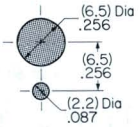
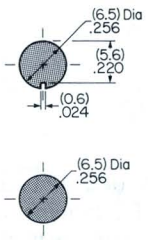
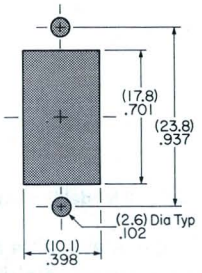
For single color LED switch, terminal 8 is omitted.

Straight PC w/Bracket Single Pole



For single color LED switch, terminal 5 is omitted.

MAXIMUM EFFECTIVE PANEL THICKNESS & PANEL CUTOUTS

Hardware:	With Standard Hardware	Without Locking Ring	Flat Frame
Panel Thickness:	2.6mm (.102")	3.4mm (.134")	3.2mm (.126")
Hardware:	Without Bottom Hex Nut	Without Locking Ring & Bottom Hex Nut	
Panel Thickness:	4.7mm (.185")	5.5mm (.216")	
Cutout:			

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NKK SERIES TL

STANDARD SIZE/LED LIGHTED TOGGLES

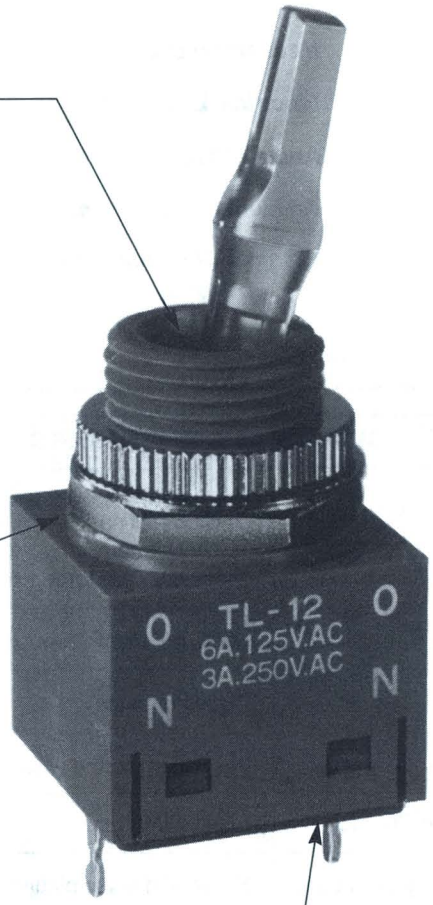
DISTINCTIVE FEATURES

A choice of full toggle illumination or LED tipped illumination is available with isolated lamp circuit.

An interior sealing ring above the toggle joint prevents entry of dust or liquids.

Panel sealed models, which include an optional rubber washer, are qualified to IP65 of IEC529 Standards.

Single unit construction of the bushing and case in glass fiber reinforced polyamide provides durability as well as protection from corrosion.



Actual Size

Terminals are epoxy sealed to lock out flux, solvents, and other contaminants.

UL Recognized and CSA Certified.

NKK SERIES TL TOGGLE SWITCHES

STANDARD SIZE/LED LIGHTED TOGGLES

GENERAL SPECIFICATIONS

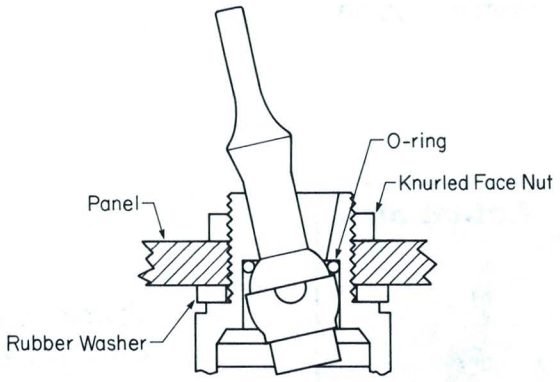
Electrical Capacity: **(Resistive Load)**	6A @ 125V AC 3A @ 250V AC
Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	1,000V AC minimum between contacts 1,500V AC minimum between contacts and case
Mechanical Life:	50,000 operations minimum
Electrical Life:	25,000 operations minimum
Angle of Throw:	25°
Ambient Temp Range:	-10°C through +55°C (+14°F through +131°F)
Nominal Operating Force:	2.5 kilograms with plastic toggle 5.0 kilograms with metal toggle

MATERIALS & FINISHES

Toggle	Polycarbonate or brass with chrome plating
Bushing/Case	Glass fiber reinforced polyamide
Sealing Ring	Nitrile butadiene rubber
Base	Diallylphthalate
Movable Contactor	Phosphor bronze w/silver plating
Movable Contact	Silver alloy
Stationary Contacts	Silver with silver plating
Lamp Contacts	Phosphor bronze with silver plating
Power Terminals	Copper with silver plating
Lamp Terminals	Brass with silver plating

DUSTPROOF & SPLASHPROOF

A nitrile butadiene rubber o-ring surrounds the toggle above the ball joint and prevents entry of dust or splashed liquids thus protecting the contact mechanism. An optional rubber washer (AT537) may also be used to provide panel seal.



APPLICATIONS

The TL toggle switches are offered in two types. The fully illuminated toggle emits light from the total length of the lever, while the LED tipped toggle emits strong, concentrated light at the very end of the lever. Both are clearly visible in low light environments.

Applications in which the TL switches can be used include instrumentation, test apparatus, radio and TV studio control consoles, and telecommunication equipment.

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NKK SERIES TL TOGGLE SWITCHES

STANDARD SIZE/LED LIGHTED TOGGLES

TYPICAL SWITCH ORDERING EXAMPLE

TL	1	3	M	C	W01

POLES

1	SPDT
2	DPDT

LED COLORS

C	Red
E	Yellow
F	Green

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON

TOGGLE TYPES

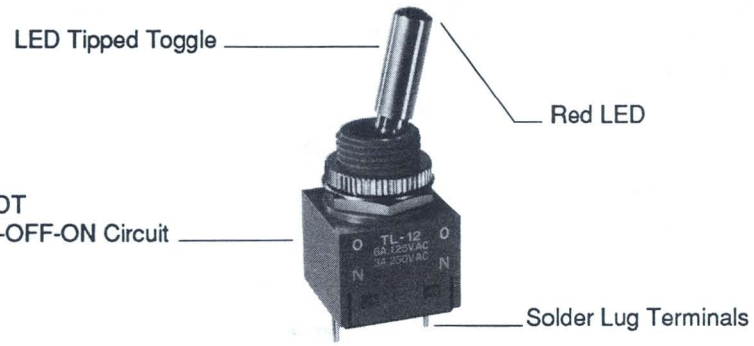
D	Full Illumination
M	LED Tipped

TERMINALS

W01	Solder Lug

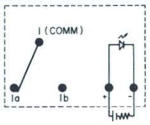
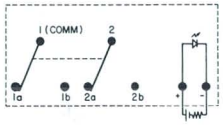
DESCRIPTION FOR TYPICAL ORDERING EXAMPLE (TL13MCW01):

SERIES TL TOGGLES



IMPORTANT: Switches are supplied without UL & CSA marking unless specified. See Supplement for instructions.

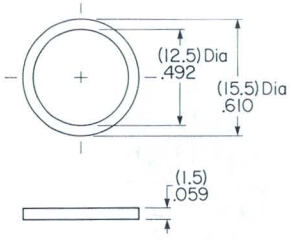
POLES AND CIRCUITS

POLE & THROW	MODEL	ACTUATOR POSITION & TERMINAL NUMBERS: Down (Keyway)	Center	Up	SCHEMATICS
SPDT	TL12	ON	NONE	ON	
	TL13	ON	OFF	ON	
CONNECTED POWER TERMINALS		1-1b	OPEN	1-1a	
DPDT	TL22	ON	NONE	ON	
	TL23	ON	OFF	ON	
CONNECTED POWER TERMINALS		1-1b 2-2b	OPEN	1-1a 2-2a	

Terminal numbers are on the swtich. Lamp circuit is isolated from power circuit.

OPTIONAL WASHER

AT537 Washer
Nitrile butadiene rubber (NBR)



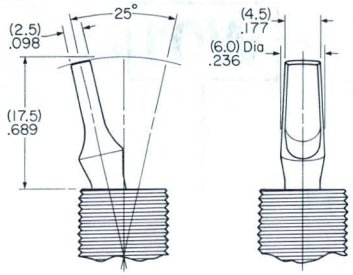
Maximum Panel Thickness with AT537 & 1 Mounting Nut: 6.0mm (.236")

NKK SERIES TL TOGGLE SWITCHES

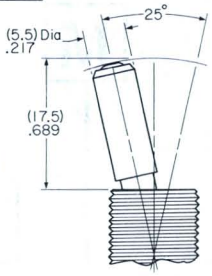
STANDARD SIZE/LED LIGHTED TOGGLES

TOGGLE TYPES

D Full Illumination



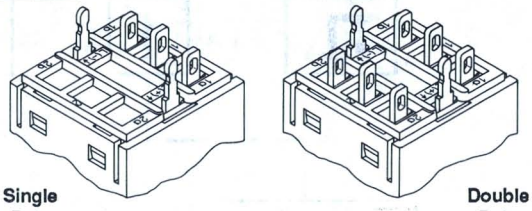
M LED Tipped



LED Colors:
C Red
E Yellow
F Green

TERMINALS

W01 Solder Lug



Lamp circuit is isolated from power circuit.

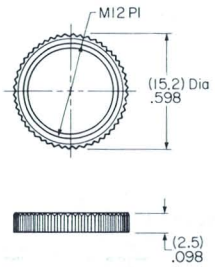
LED SPECIFICATIONS

LEDs are supplied as an integral part of the TL devices and are not available separately. LED polarity markings are on the bottom of the switch. The electrical specifications shown are determined at a basic temperature of 25°C. If the source voltage exceeds rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula at the end of this catalog. Lamp life: 100,000 hours.

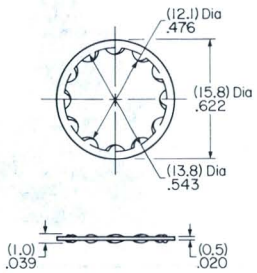
		Red	Yellow	Green
Forward Peak Current	I_{FM}	30mA	50mA	50mA
Continuous Forward Current	I_F	20mA	20mA	20mA
Forward Voltage	V_F	2.0V	2.1V	2.1V
Reverse Peak Current	V_{RM}	4V	4V	4V
Current Reduction Rate Above 25°C	ΔI_F	0.33mA/°C	0.67mA/°C	0.67mA/°C

STANDARD MOUNTING HARDWARE

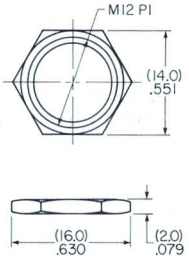
AT504
Knurled Face Nut
Chrome/brass



AT508
Internal Tooth Lockwasher
Nickel/steel



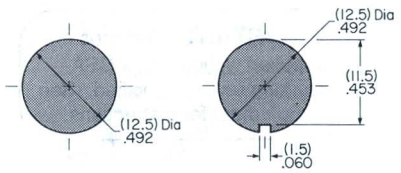
AT527
Hex Mounting Nut
Nickel/steel



PANEL CUTOUTS

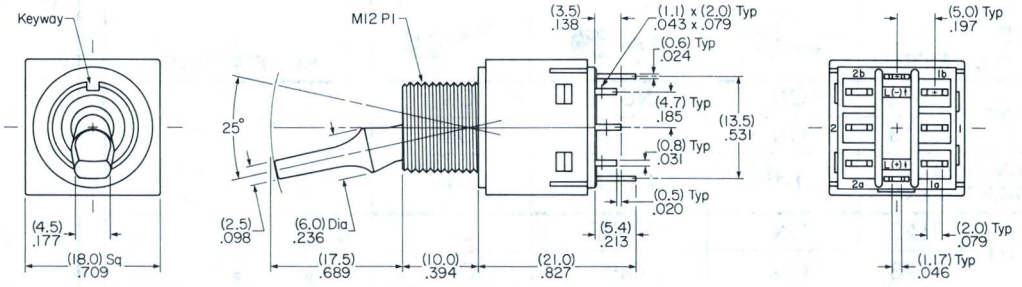
Maximum Effective Panel Thickness Using Standard Hardware:

4.0mm (.158")



Full Toggle Illumination/Single & Double Pole

TL12DCW01 Model Shown



Single pole models have only terminals 1a, 1, & 1b.

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SUPPLEMENT

Accessories Z2

Hardware Z15

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Conversions Z23

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Electrical Data Z28

Glossary Z29

Elements/Federal Supply Code Number Z34

Index by Model Number Z35

Illustrated Contents by Product Sequence Z42

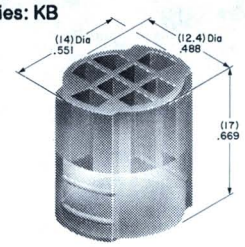
NKK ACCESSORIES

Color Codes: **A** Black **B** White **C** Red **D** Orange **E** Yellow **F** Green **G** Blue **H** Gray **J** Clear

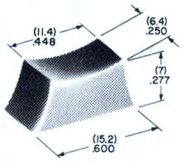
Finishes: Customers should contact the factory when desiring a finish other than standard for an accessory. The following codes are used for some accessories: **3** Black **4** Bright chrome **5** Satin chrome **6** Bright nickel **7** Dull nickel **8** Zinc plating **9** Brushed aluminum

Even though standard colors, finishes, etc. are described in the Accessories section, the customer can rely on NKK's accommodation to special needs. Simply contact the factory when an application calls for legends on caps, variations in color, or any other custom feature on an accessory.

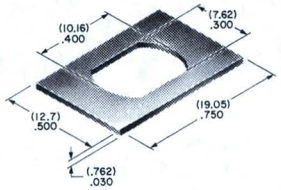
AT055
Crossover Guard
Polypropylene
Series: KB



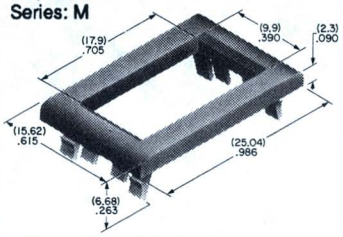
AT062
.250" Wide Rocker
Nylon
Colors: A B C E F G
Series: A



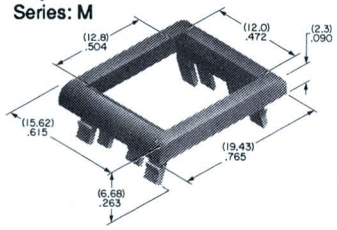
AT063
Dust Cover
Silicone rubber
Series: M



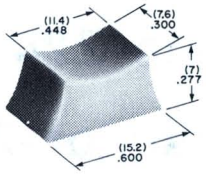
AT0641 & AT0642
Panel Frame for Rocker & Paddle .365" Wide
Polyamide Color: A
Series: M



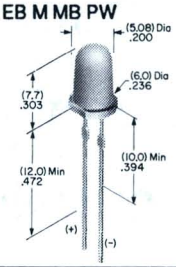
AT0651 & AT0652
Panel Frame for Rocker & Paddle .453" Wide
Polyamide Color: A
Series: M



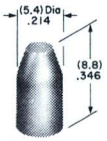
AT066
.300" Wide Rocker
Nylon
Colors: A B C E F G
Series: A



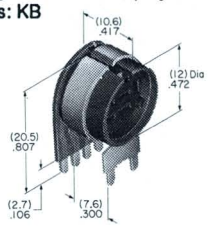
AT070
LED for AT208 Bezel
Color: C F
Series: EB M MB PW



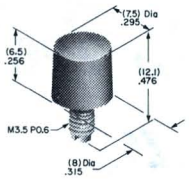
AT076
Cap for Locking Lever (code L1)
Bright nickel
Brushed or colored aluminum
Colors: A C G
Series: M P



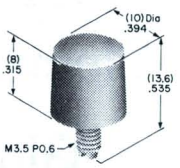
AT077
Single Pole Right Angle PC Adaptor
Fiberglass reinforced polyamide
Series: KB



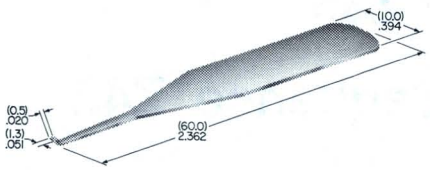
AT078
.315" Dia. Screw-on Cap
Polystyrene
Colors: A B C E F G H
Series: MB SCB



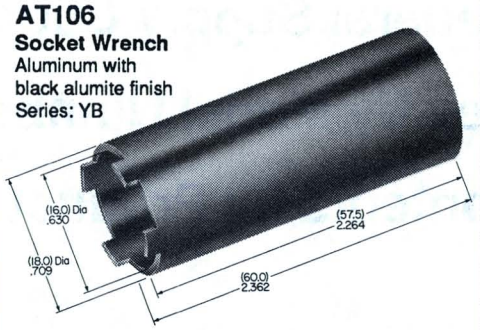
AT079
.394" Dia. Screw-on Cap
Polystyrene
Colors: A B C E F G H
Series: MB SCB



AT105
Cap Removal Tool
Stainless steel
Series: YB



AT106
Socket Wrench
Aluminum with black alumite finish
Series: YB



AT107
Lamp Extractor
Polyvinyl chloride
Series: KB LB LW MLW YB

Supplement

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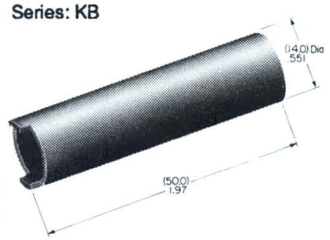
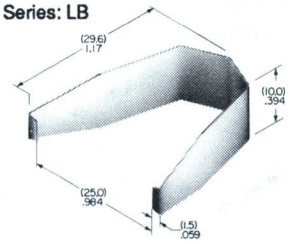
NKK ACCESSORIES

AT108
Socket Wrench
Aluminum
Series: KB

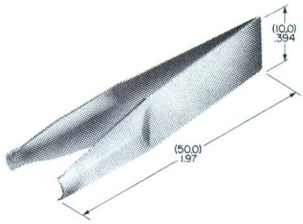


AT109
Cap Extractor
Stainless Steel
Series: LB

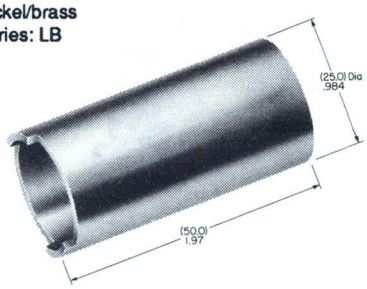


AT110
Socket Wrench
Brass
Series: HB

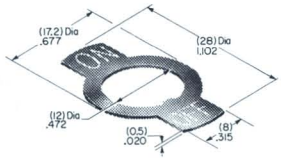
AT111
Lamping Tool
Stainless Steel
Series: HB



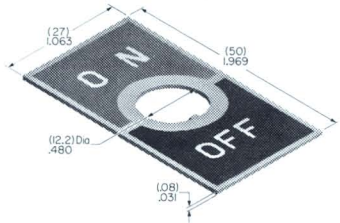
AT112
Socket Wrench
Nickel/brass
Series: LB



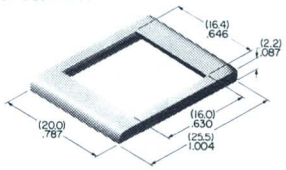
AT201
ON-OFF Plate for 12mm Threaded Bushing
Nickel/brass
Series: M P S



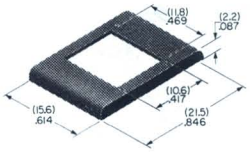
AT202 ON-OFF Plate for 12mm Threaded Bushing
Nickel/brass
Colors: Red & black enamel
Series: M P S



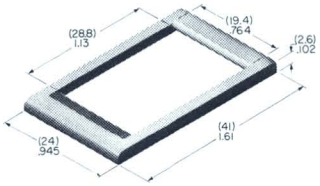
AT204
Bezel
Polycarbonate
Colors: A B C D E F G H
Series: MLW



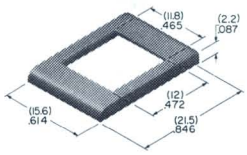
AT205
Bezel
Polycarbonate
Colors: A B C E F G H
Series: PW



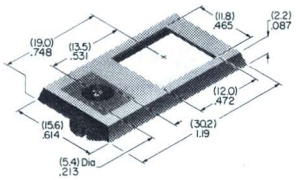
AT206
Bezel
Polycarbonate
Colors: A B C D E F G H
Series: LW



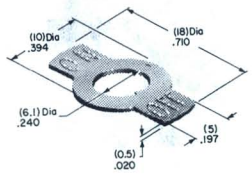
AT207
Bezel
Polycarbonate
Colors: A B C E F G H
Series: EB M MB M21 PW



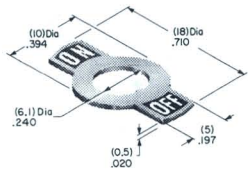
AT208
Bezel with AT070 LED
Polycarbonate
Color: A
Series: EB M MB PW



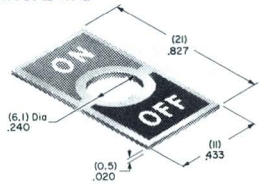
AT209
ON-OFF Plate for 6mm Threaded Bushing
Nickel/brass
Series: E M S



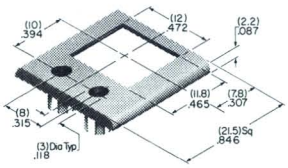
AT210
ON-OFF Plate for 6mm Threaded Bushing
Nickel/brass
Colors: Red & black ink
Series: E M S



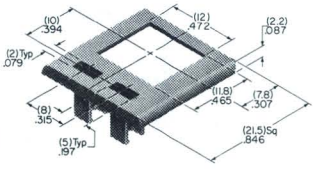
AT211
ON-OFF Plate for 6mm Threaded Bushing
Nickel/brass
Colors: Red & black enamel
Series: E M S



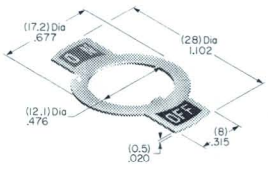
AT212
Bezel with 2 AT617 LEDs
Polycarbonate
Color: A
Series: EB M MB PW



AT213
Bezel with 2 AT618 LEDs
Polycarbonate
Color: A
Series: EB M MB PW

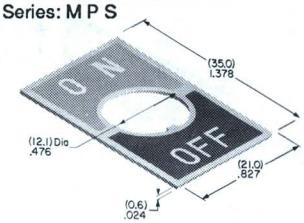


AT214
ON-OFF Plate for 12mm Threaded Bushing
Nickel/brass
Colors: Red & black ink
Series: M P S

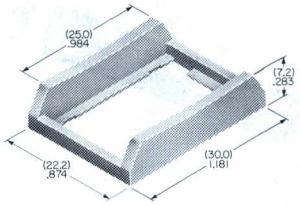


NKK ACCESSORIES

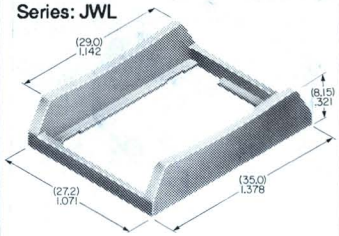
AT215 ON-OFF Plate for 12mm Threaded Bushing
Nickel/brass
Colors: Red & black enamel
Series: M P S



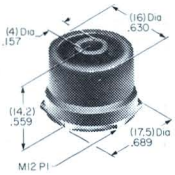
AT217
Small Bezel
Polyamide
Colors: A B H
Series: JWM



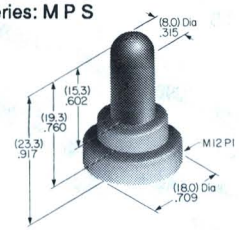
AT218
Large Bezel
Polyamide
Colors: A B H
Series: JWL



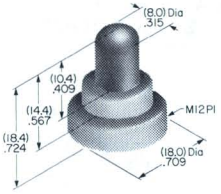
AT401
Splashproof Cap
Nitrile butadiene rubber
Colors: A H
Series: M P S



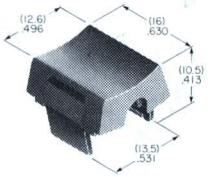
AT402
Waterproof Boot
Silicone rubber
Series: M P S



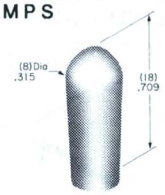
AT402C
Waterproof Boot
Silicone rubber
Series: M



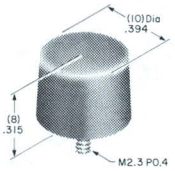
AT405
Solid Colored Rocker
Polycarbonate
Colors: A B C D E F G
Series: MLW



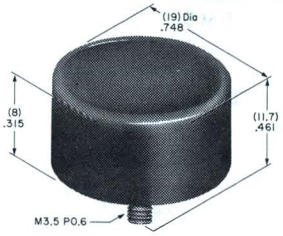
AT406
Bat Lever Cap
Polyvinyl chloride
Colors: A B C E F G
Series: M P S



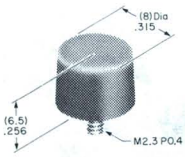
AT407
.394" Dia. Screw-on Cap
Polystyrene
Colors: A B C E F G H
Series: MB



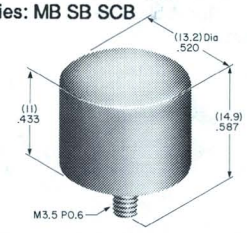
AT412
.748" Dia. Screw-on Cap
Polystyrene Colors: A B C F
Series: MB SCB momentary



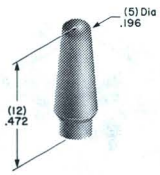
AT413
.315" Dia. Screw-on Cap
Polystyrene
Colors: A B C E F G H
Series: MB



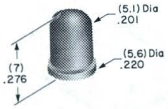
AT414
.520" Dia. Screw-on Cap
Polystyrene
Colors: A B C D E F G H
Series: MB SB SCB



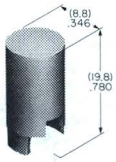
AT415
Bat Lever Cap
Polyethylene
Colors: A B C E F G
Series: E M M2T



AT416
Lamp Cover for AT602
Silicone rubber
Colors: C D F
Series: LW



AT417
.346" Dia. Solid Colored Cap
Polycarbonate
Colors: B C D E F G
Series: DLB



Supplement

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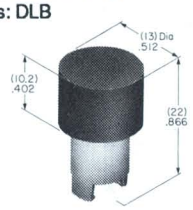
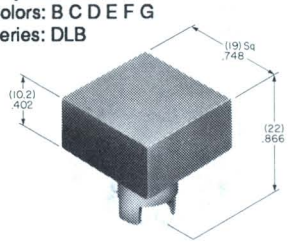
NKK ACCESSORIES

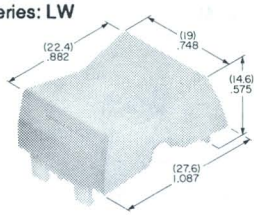
AT418
.512" Dia. Solid Colored Cap
Polycarbonate
Colors: B C D E F G
Series: DLB



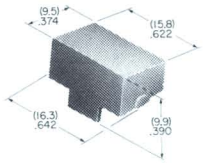
AT419
.748" Sq. Solid Colored Cap
Polycarbonate
Colors: B C D E F G
Series: DLB



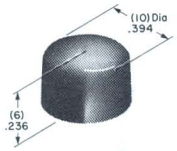
AT420
Rocker
Polycarbonate
Colors: B J
Series: LW



AT421
Filter for AT420
Polycarbonate
Colors: B C D E F G
Series: LW

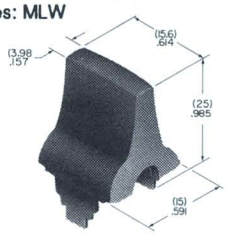


AT422
Slip-on Cap
Polyethylene
Colors: A B C E F G
Series: SB4011



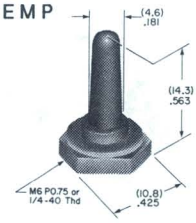
AT423
Mushroom Cap
Polyamide
Colors: A
Series: SB282 MB

AT426
Solid Colored Paddle
Polycarbonate
Colors: A B C D E F G
Series: MLW

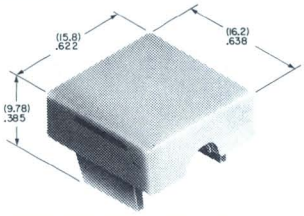


AT427 Cap for Locking Lever (code L)
Bright nickel
Brushed or colored aluminum
Colors: A C G
Series: M P

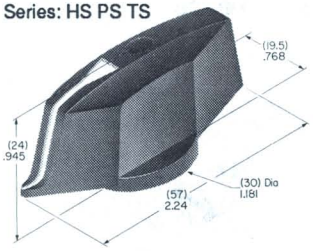
AT428 (M-metric H-inch)
Waterproof Boot
Silicone rubber
Color: A
Series: E M P



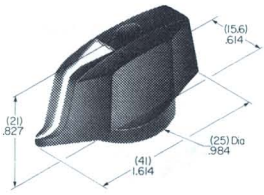
AT429
Indicator Cap
Polycarbonate
Colors: B C D E F G
Series: MLW



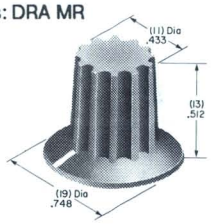
AT431 Large Rotary Knob
Phenolic resin
Color: A
Series: HS PS TS



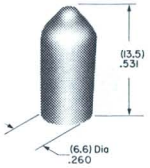
AT432 Small Rotary Knob
Phenolic resin
Color: A
Series: HS PS TS



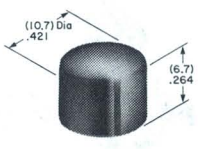
AT433
Knob for Miniature Rotaries
Polyacetal
Color: A
Series: DRA MR



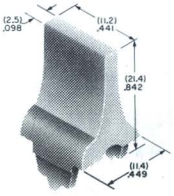
AT434
Bat Lever Cap
Polyvinyl chloride
Colors: A B C E F G
Series: M



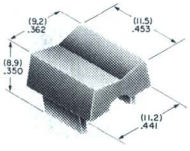
AT435
Screw-on Cap
Chrome/brass
Series: SB



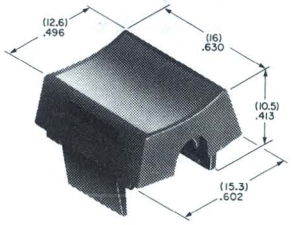
AT436 Paddle
Polycarbonate
Colors: A B C E F G H
Series: PW



AT437
Rocker
Polycarbonate
Colors: A B C E F G H
Series: PW

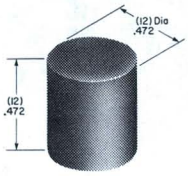


AT438 Design Rocker
Polycarbonate
Colors: B C D F G
Series: MLW

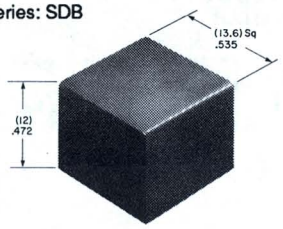


ACCESSORIES

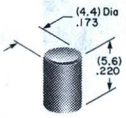
AT439
Round Snap-on Cap
Polycarbonate
Colors: A B C F
Series: SDB



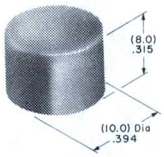
AT440
Square Snap-on Cap
Polycarbonate
Colors: A B C F
Series: SDB



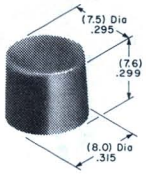
AT441
Cap for Color Tipped Column Lever
Polypropylene
Colors: A B C E F G
Series: M



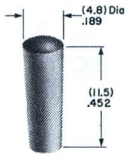
AT442
.394" Dia. Snap-on Cap
Polycarbonate
Colors: A B C E F G H
Series: EB M2B MB



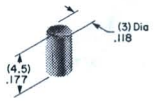
AT443
.315" Dia. Snap-on Cap
Polycarbonate
Colors: A B C E F G H
Series: EB M2B MB



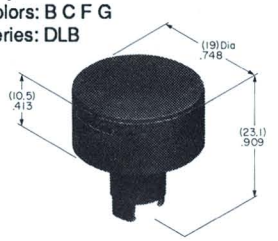
AT444
Bat Lever Conical Cap
Polyethylene
Colors: A B C E F G
Series: E M M2T



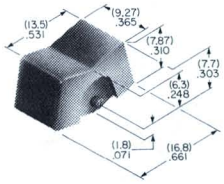
AT445
Cap for Color Tipped Cone Toggle
Polycarbonate
Colors: A B C E F G
Series: M



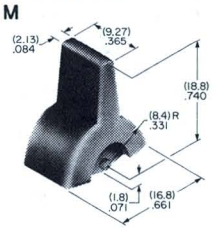
AT446
.748" Dia. Round Design Cap
Polycarbonate
Colors: B C F G
Series: DLB



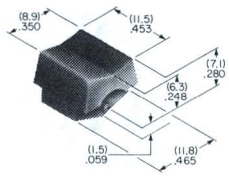
AT448
.365" Wide Rocker
Polycarbonate
Colors: A B C E F G H
Series: M



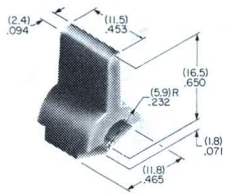
AT449
.365" Wide Paddle
Polycarbonate
Colors: A B C E F G H
Series: M



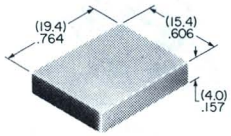
AT450
.453" Wide Rocker
Polycarbonate
Colors: A B C E F G H
Series: M



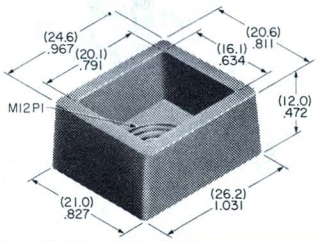
AT451
.453" Wide Paddle
Polycarbonate
Colors: A B C E F G H
Series: M



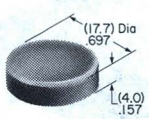
AT452
Rectangular Insert
Polycarbonate
Colors: A B C F G H
Series: MB SCB
Used with Screw Adaptor AT080



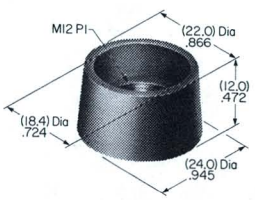
AT453 Rectangular Shroud
Polycarbonate
Colors: A B H
Series: MB SCB



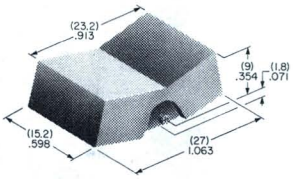
AT454
Round Insert
Polycarbonate
Colors: A B C F G H
Series: MB SCB
Used with Screw Adaptor AT080



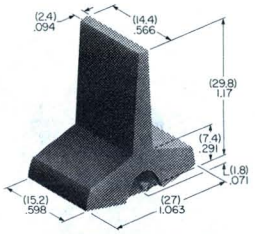
AT455
Round Shroud
Polycarbonate
Colors: A B H
Series: MB SCB



AT456
.598" Wide Rocker
Polycarbonate
Colors: A B C E F G H
Series: M P



AT457 .598" Wide Paddle
Polycarbonate
Colors: A B C E F G H
Series: M P



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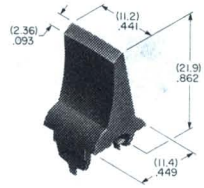
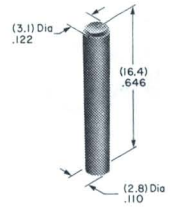
NKK ACCESSORIES

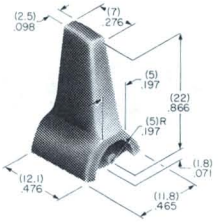
AT458
Paddle
Polycarbonate
Colors: A B C E F G H
Series: PW



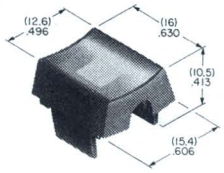
AT460
Long Plastic Toggle Tip
Polyethylene
Colors: A B C E F G
Series: M



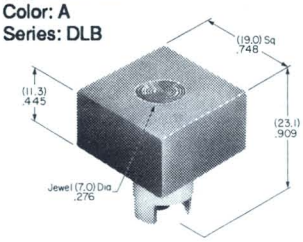
AT461 .476" Wide Paddle
Polycarbonate
Colors: A B C E F G H
Series: M M2T



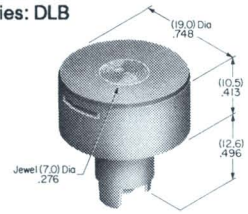
AT462
Spot Illuminated Rocker
Polycarbonate
Color: A
Series: MLW



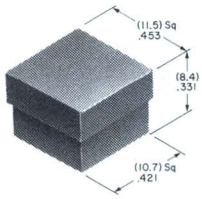
AT463 .748" Square Spot Illuminated Cap with LED
Polycarbonate
Color: A
Series: DLB



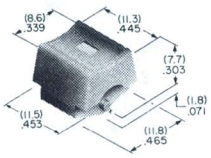
AT464 .748" Dia. Round Spot Illuminated Cap with LED
Polycarbonate
Color: A
Series: DLB



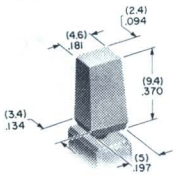
AT465 Pushbutton Cap
Polycarbonate
Colors: A B C E F G H
Series: EB MB



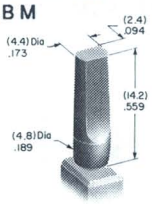
AT466
.453" False Illuminated Rocker
Polycarbonate
Color: A with B/C
Series: M



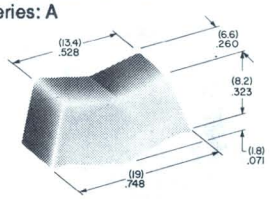
AT467
Short Paddle
Nylon
Colors: A B C E F G H
Series: A B M



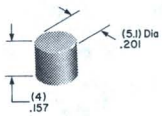
AT468
Long Paddle
Nylon
Colors: A B C E F G H
Series: A B M



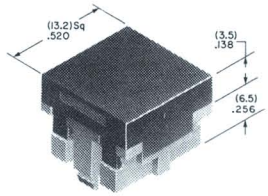
AT469
.260" Wide Rocker
Polyamide
Colors: A B C E F G H
Series: A



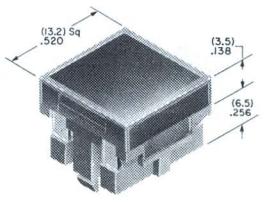
AT475
.201" Dia. Cap
Polycarbonate
Colors: A B C
Series: AB BB FB M2B MB



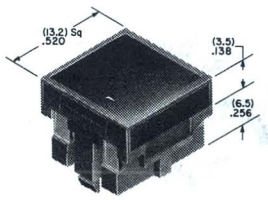
AT476
Square Solid Colored Cap
Polycarbonate
Colors: B C E F G
Series: LB



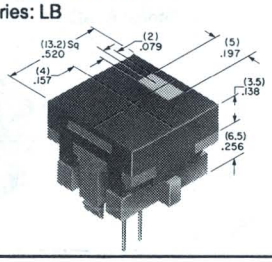
AT477
Square Colored Insert Cap
Polycarbonate
Colors: B C E F G
Series: LB



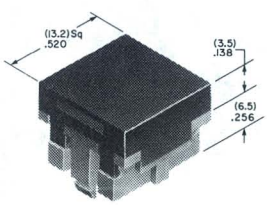
AT478
Square Cap for LED
Polycarbonate
Colors: C E F
Series: LB



AT480
Square Spot Illuminated Cap
Polycarbonate
Colors: A B C F CF
Series: LB

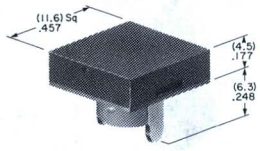


AT484
Square Nonilluminated Cap
Polycarbonate
Colors: A B C E F G H
Series: LB

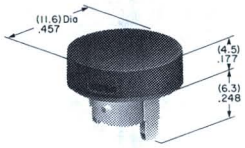


NKK ACCESSORIES

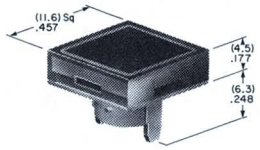
AT485
Square Solid Colored Cap
Polycarbonate
Colors: A B C E F G
Series: KB



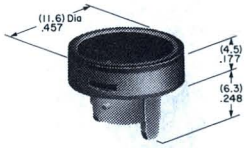
AT486
Round Solid Colored Cap
Polycarbonate
Colors: B C E F G
Series: KB



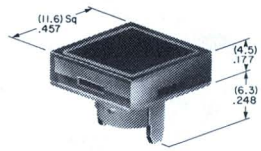
AT487
Square Colored Insert Cap
Polycarbonate
Colors: B C E F G
Series: KB



AT488
Round Colored Insert Cap
Polycarbonate
Colors: B C E F G
Series: KB

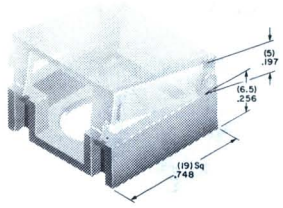


AT489
Square Cap for LED
Polycarbonate
Colors: C E F
Series: KB

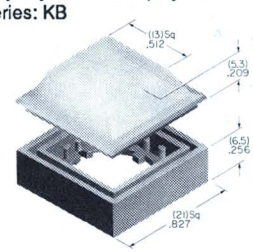


AT490
Round Cap for LED
Polycarbonate
Colors: C E F
Series: KB

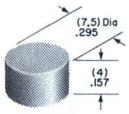
AT494
Protective Guard
Polycarbonate & polyamide
Series: KB



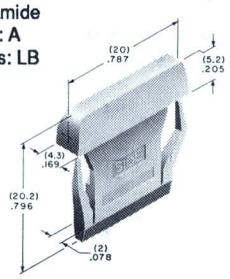
AT495
Splash Cover
Polyvinyl chloride & polyamide
Series: KB



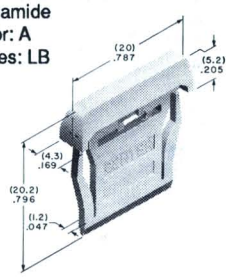
AT496
.295" Dia. Cap
Polycarbonate
Colors: A B C
Series: AB BB FB M2B MB



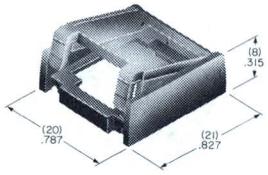
AT497
End Barrier
Polyamide
Color: A
Series: LB



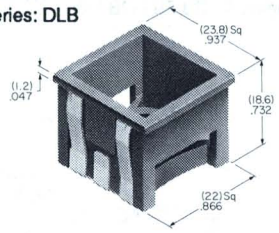
AT498
Center Barrier
Polyamide
Color: A
Series: LB



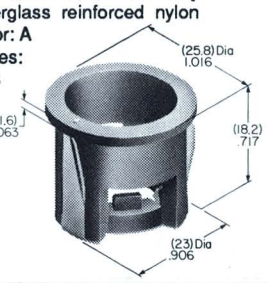
AT499
Protective Guard
Polycarbonate & polyamide
Series: LB



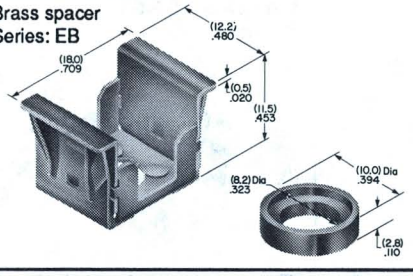
AT517
Mounter for Square Cap
Fiberglass reinforced nylon
Color: A
Series: DLB



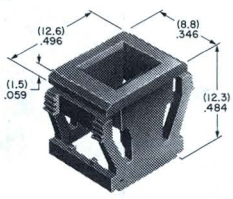
AT528
Mounter for Round Cap
Fiberglass reinforced nylon
Color: A
Series:
DLB
MB



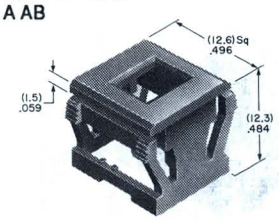
AT529
Mounter for Square Cap
Stainless steel frame
Brass spacer
Series: EB



AT530
Panel Mount for Single Pole
Polycarbonate
Colors: A B C E F G H
Series: A AB



AT531
Panel Mount for Single or Double Pole
Polycarbonate
Colors: A B C E F G H
Series: A AB

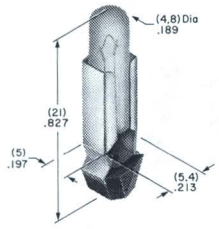


Supplement

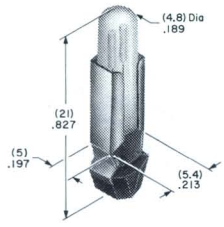
NKK switches • 7850 E. Gelding Dr. • Scottsdale, AZ 85260 • Phone (602) 991-0942 • Fax (602) 998-1435

NKK ACCESSORIES

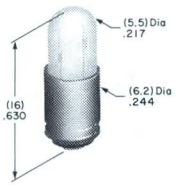
AT602 Incandescent Lamp
Volts: 6 12 18 24 28
Series: LW MLW
T-1 1/2 Pilot Slide Base



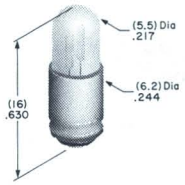
AT602N Neon Lamp
Volts: 110
Series: LW MLW
T-1 1/2 Pilot Slide Base



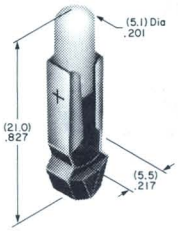
AT604 Incandescent Lamp
Volts: 6 14 28
Series: DLB
T-1 3/4 Midget Groove Base



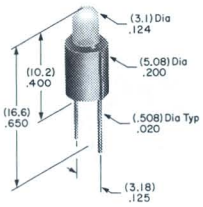
AT604N Neon Lamp
Volts: 110
Series: DLB
T-1 3/4 Midget Groove Base



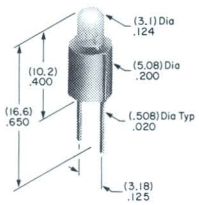
AT606 Single Element LED
Colors: C F
Series: MLW
T-1 1/2 Pilot Slide Base



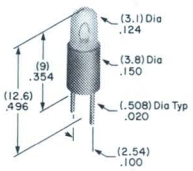
AT607 Incandescent Lamp
Volts: 5 12 28
Series: LB
T-1 Standard Bi-pin



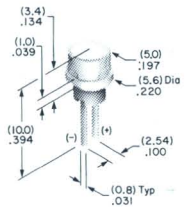
AT607N Neon Lamp
Volts: 110
Series: LB
T-1 Standard Bi-pin



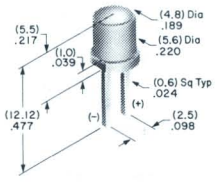
AT611 Incandescent Lamp
Volts: 5 12 28
Series: KB YB
T-1 Standard Bi-pin



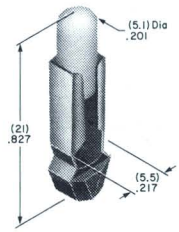
AT612 Double Element LED
Colors: C E F
Series: KB
T-1 1/2 Cylindrical



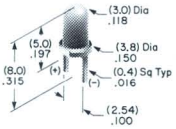
AT614 Single Element LED
Colors: C E F
Series: KB LB
T-1 1/2 Cylindrical



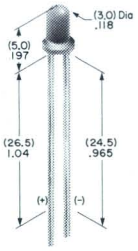
AT615 Neon Lamp
Volts: 110
Series: KB
T-1 Standard Bi-pin



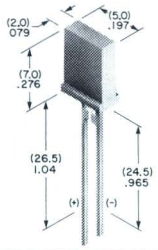
AT616 Single Element LED
Colors: C E F
Series: HB



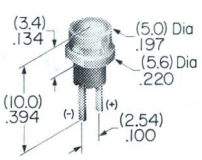
AT617 Single Element LED
Colors: C E F
Used for AT212 Bezel



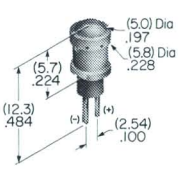
AT618 Single Element LED
Colors: C E F
Used for AT213, AT480, & AT4016



AT620
4-element Single Color LED
Colors: C E F
Series: YB
T-1 1/2 Standard Bi-pin

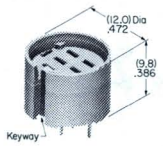


AT621
6-element Bicolor LED
Colors: CF
Series: YB
T-1 1/2 Standard Bi-pin

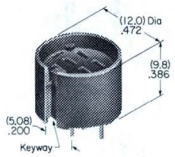


NKK ACCESSORIES

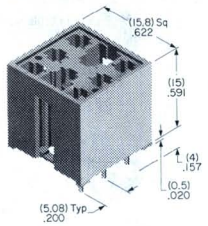
AT701 Single Pole
Straight PC Adaptor
Fiberglass reinforced polyamide
Series: KB



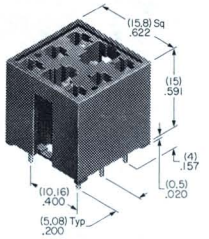
AT702 Double Pole
Straight PC Adaptor
Fiberglass reinforced polyamide
Series: KB



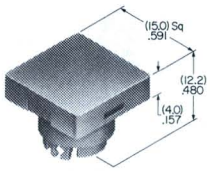
AT711 Single Pole
Straight PC Adaptor
Fiberglass reinforced polyamide
Series: LB



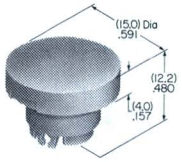
AT712 Double Pole
Straight PC Adaptor
Fiberglass reinforced polyamide
Series: LB



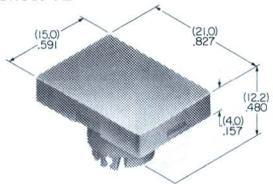
AT3001
Square Solid Cap
Polycarbonate
Colors: B C E F G
Series: YB



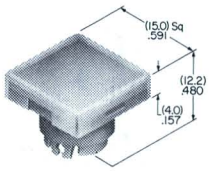
AT3002
Round Solid Cap
Polycarbonate
Colors: B C E F G
Series: YB



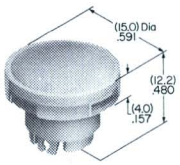
AT3003
Rectangular Solid Cap
Polycarbonate
Colors: B C E F G
Series: YB



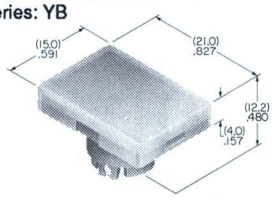
AT3004
Square LED Cap
Polycarbonate
Colors: JB JC JE JF
Series: YB



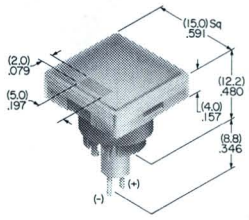
AT3005
Round LED Cap
Polycarbonate
Colors: JB JC JE JF
Series: YB



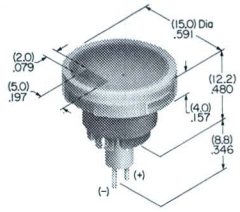
AT3006
Rectangular LED Cap
Polycarbonate
Colors: JB JC JE JF
Series: YB



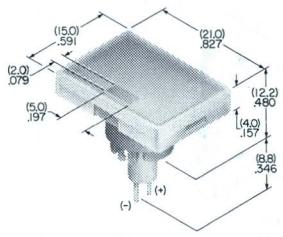
AT3010 Square Spot Illuminated Cap with Built-in LED
Polycarbonate LED Colors: C E F CF
Voltages: 02 05 12 24
Insert Colors: A B C E F Series: YB



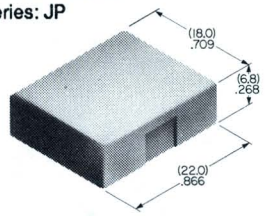
AT3011 Round Spot Illuminated Cap with Built-in LED
Polycarbonate LED Colors: C E F CF
Voltages: 02 05 12 24
Insert Colors: A B C E F Series: YB



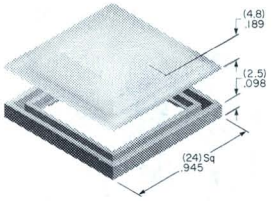
AT3012 Rectangular Spot Illuminated Cap with Built-in LED
Polycarbonate LED Colors: C E F CF
Voltages: 02 05 12 24
Insert Colors: A B C E F Series: YB



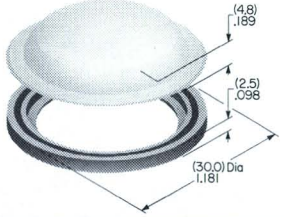
AT3021
Flat Cap for Barrier Flange
Material: Polyphenylene oxide
Colors: A B C H
Series: JP



AT4001
Square Splash Cover
Polyvinyl chloride & polyethylene
Series: LB



AT4002
Round Splash Cover
Polyvinyl chloride & polyethylene
Series: LB



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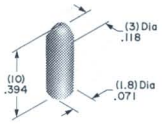
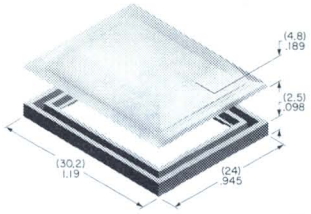
NKK ACCESSORIES

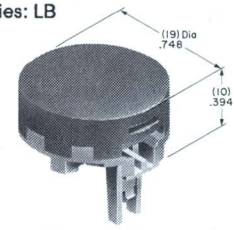
AT4003
.394" Bat Lever Cap
Polyvinyl chloride
Colors: A B C
Series: A B



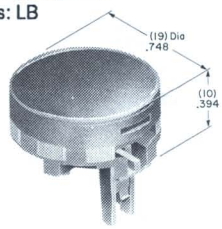
AT4011
Rectangular Splash Cover
Polyvinyl chloride & polyethylene
Series: LB



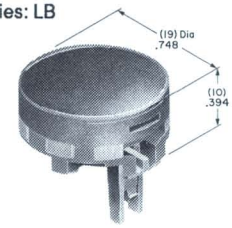
AT4012
Round Solid Colored Cap
Polycarbonate
Colors: B C E F G
Series: LB



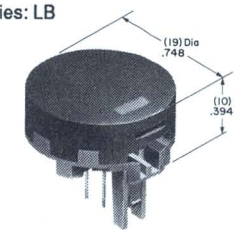
AT4013
Round Colored Insert Cap
Polycarbonate
Colors: B C E F G
Series: LB



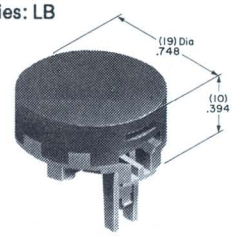
AT4014
Round Cap for LED
Polycarbonate
Colors: C E F
Series: LB



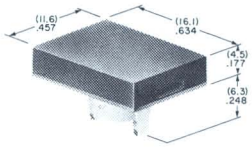
AT4016
Round Spot Illuminated Cap
Polycarbonate
Colors: A B C F CF
Series: LB



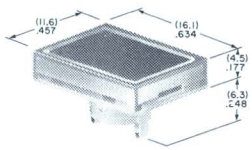
AT4017
Round Nonilluminated Cap
Polycarbonate
Colors: A B C E F G H
Series: LB



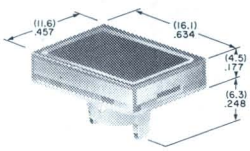
AT4021
Rectangular Solid Colored Cap
Polycarbonate
Colors: B C E F G
Series: KB



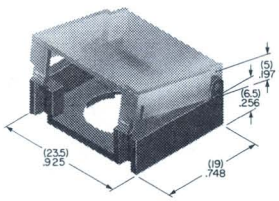
AT4022
Rectangular Colored Insert Cap
Polycarbonate
Colors: B C E F G
Series: KB



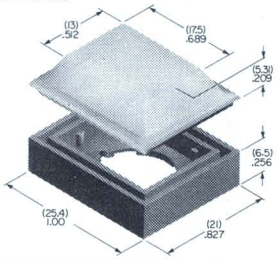
AT4023
Rectangular Cap for LED
Polycarbonate
Colors: C E F
Series: KB



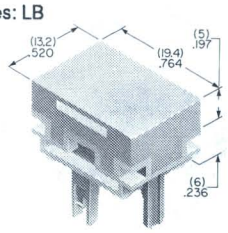
AT4024
Protective Guard
Polycarbonate & polyamide
Series: KB



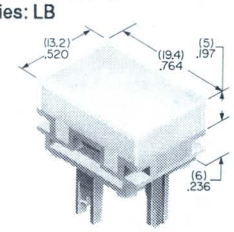
AT4025 Rectangular Splash Cover
Polyvinyl chloride & polyamide
Series: KB



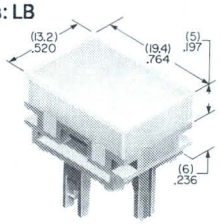
AT4026
Rectangular Solid Colored Cap
Polycarbonate
Colors: B C E F G
Series: LB



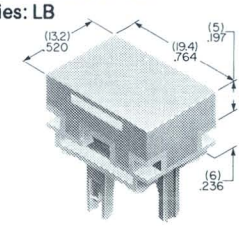
AT4027
Rectangular Colored Insert Cap
Polycarbonate
Colors: B C E F G
Series: LB



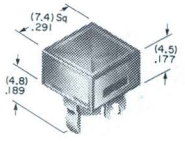
AT4028
Rectangular Cap for LED
Polycarbonate
Colors: C E F
Series: LB



AT4030 Rectangular Cap for Nonilluminated
Polycarbonate
Colors: A B C E F G H
Series: LB

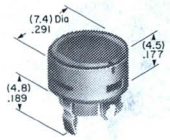


AT4031 Square Transparent Cap for LED
Polycarbonate
Colors: C E F
Series: HB

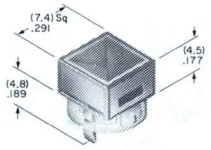


NKK ACCESSORIES

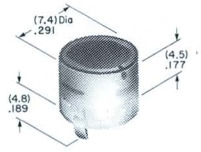
AT4032 Round Transparent Cap for LED
Polycarbonate
Colors: C E F
Series: HB



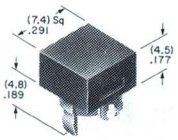
AT4033
Square Indicator Cap
Polycarbonate
Colors: C E F
Series: HB



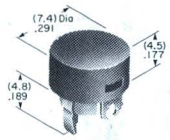
AT4034
Round Indicator Cap
Polycarbonate
Colors: C E F
Series: HB



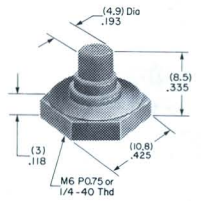
AT4035
Square Nonilluminated Cap
Polycarbonate
Colors: A B C E F G
Series: HB



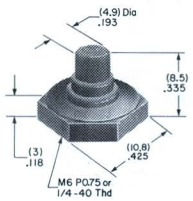
AT4036
Round Nonilluminated Cap
Polycarbonate
Colors: B C E F G
Series: HB



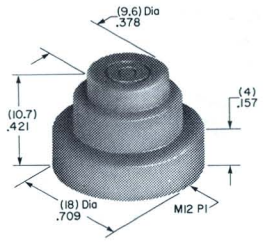
AT4041 (M-metric H-inch)
Waterproof Boot for Momentary
Silicone rubber
Series: MB



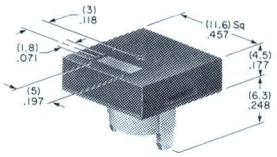
AT4042 (M-metric H-inch)
Waterproof Boot for Alternate
Silicone rubber
Series: MB



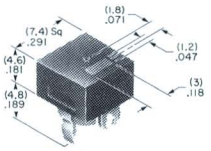
AT4043 Waterproof Boot
Silicone rubber
Series: MB



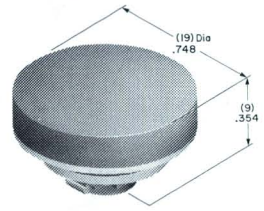
AT4051
Spot Illuminated Cap
Polycarbonate
Color: A
Series: KB



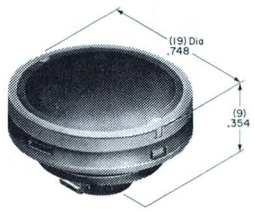
AT4052
Spot Illuminated Cap
Polycarbonate
Color: A
Series: HB



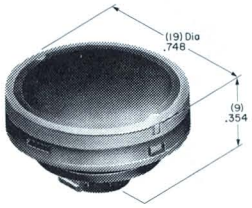
AT4054
Round Solid Colored Cap
Polycarbonate
Colors: B C E F G
Series: LB Panel Seal



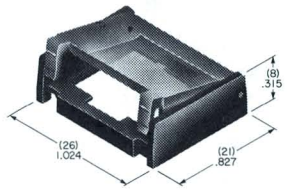
AT4055
Round Colored Insert Cap
Polycarbonate
Colors: B C E F G
Series: LB Panel Seal



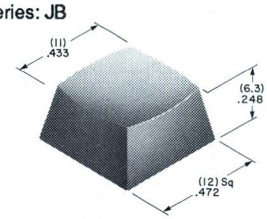
AT4056
Round Cap for LED
Polycarbonate
Colors: C E F
Series: LB Panel Seal



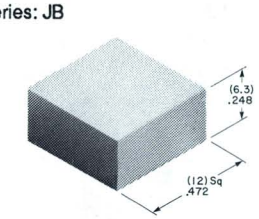
AT4057
Protective Guard
Polycarbonate
Series: LB



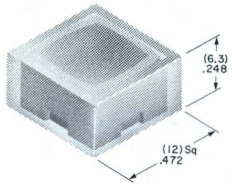
AT4058 Nonilluminated Sculptured Cap
Polyamide
Colors: A B C E F G H
Series: JB



AT4059
Nonilluminated Flat Cap
Polycarbonate
Colors: A B C E F G H
Series: JB



AT4060
Clear Cap w/Colored Diffuser
Polycarbonate
Colors: B C E F
Series: JB



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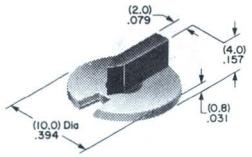
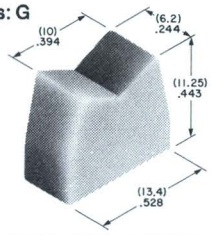
NKK ACCESSORIES

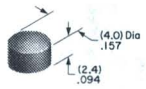
AT4061
Snap-In Knob
Polycarbonate
Color: A with J
Series: DR



AT4062
Rocker
Polyamide
Colors: A B C
Series: G

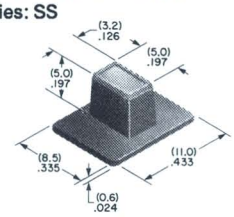


AT4063
.157" Dia. Slip-on Cap
Polyamide
Color: A B C
Series: GB

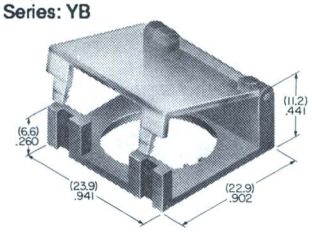


AT4064
.248" Bat Lever Cap
Polyvinyl chloride
Color: C
Series: A B

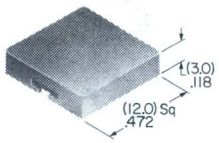
AT4065
Slide Cap
Polycarbonate
Cap: A Window: C E F
Series: SS



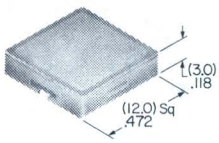
AT4072 Protective Guard
Lid: Polycarbonate
Base: Glass Fiber Reinforced Polycarbonate
Series: YB



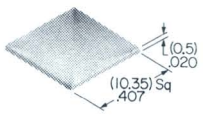
AT4073
Opaque Cap for Nonilluminated
Polycarbonate
Colors: C E F J
Series: UB



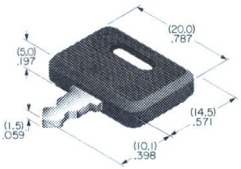
AT4074 Transparent Cap for Illuminated
Polycarbonate
Colors: C E F J
Series: UB



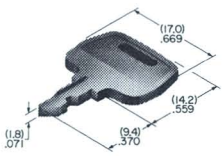
AT4075
Diffuser for AT4074 Cap
Polycarbonate
Colors: C E F J
Series: UB



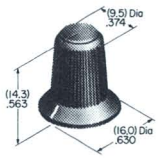
AT4080
Actuator Key
ABS resin/brass
Color: A
Series: SK (Low Security)



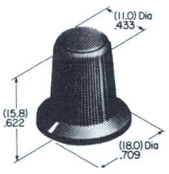
AT4081
Actuator Key
Chrome/zinc alloy
Series: SK (Low Security)



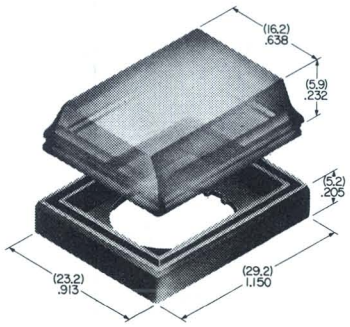
AT4103
Short Color Tipped Knob
Polyester w/polyamide tip
Base Color: A
Tip Colors: A B C E F G H
Series: DRA MR



AT4104
Long Color Tipped Knob
Polyester w/polyamide tip
Base Color: A
Tip Colors: A B C E F G H
Series: DRA MR

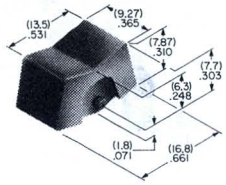


AT4115
Splash Cover
Lid: Polyvinyl chloride
Base: Polyamide
Series: YB

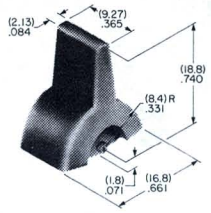


NKK ACCESSORIES

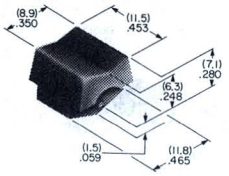
AT4148 .365" Wide Rocker
Nylon
Colors: A B C E F G H
Series: M M2T



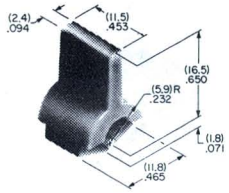
AT4149 .365" Wide Paddle
Nylon
Colors: A B C E F G H
Series: M M2T



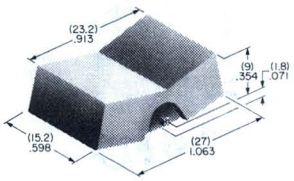
AT4150 .453" Wide Rocker
Nylon
Colors: A B C E F G H
Series: M M2T P



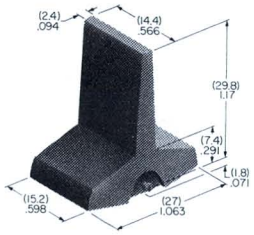
AT4151 .453" Wide Paddle
Nylon
Colors: A B C E F G H
Series: M M2T P



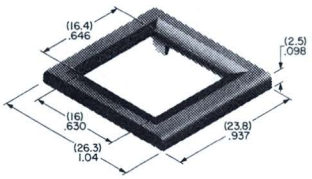
AT4156 .598" Wide Rocker
Nylon
Colors: A B C E F G H
Series: M M2T P



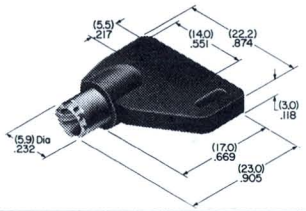
AT4157 .598" Wide Paddle
Nylon
Colors: A B C E F G H
Series: M M2T P



AT9201
Bezel
Polycarbonate
Colors: A B C D E F G H
Series: MLW



AT9412-xxx (x = 3-digit key no.)
Actuator Key
Brass with chrome plating &
ABS resin handle
Series: SK (High Security)



Supplement

NKK switches • 7850 E. Gelding Dr. • Scottsdale, AZ 85260 • Phone (602) 991-0942 • Fax (602) 998-1435

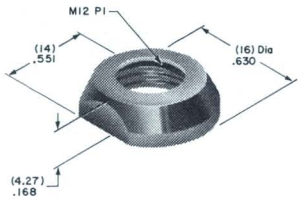
HARDWARE

Many hardware pieces are available in both metric and inch threading, and in such cases M (metric) and H (inch) are noted in the descriptions below. The customer must select threading by placing an M or H after the basic AT part number. If the hardware is available only in metric or inch, no code is used in the description; the drawing designates the threading.

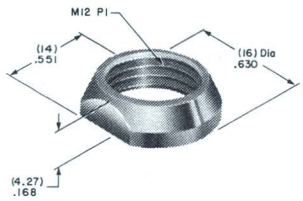
Standard materials are shown in the descriptions. All of the nickel and chrome platings are bright finishes. The following codes should be used for ordering optional finishes and materials: **3** Black **4** Bright chrome **5** Satin chrome **6** Bright nickel **7** Dull nickel **8** Zinc plating **9** Brushed aluminum. Contact the factory for availability of these custom finishes and materials.

AT050
Knurled Nut
Nickel/brass

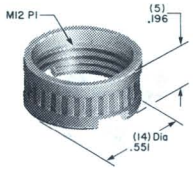
AT056
Dress Cap Nut
Chrome/brass



AT056T
Threaded Through Dress Nut
Chrome/brass

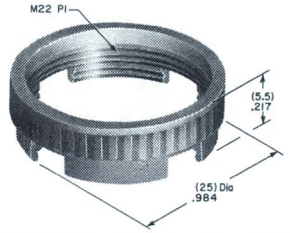


AT057
Mounting Nut
Nickel/brass
Series: KB

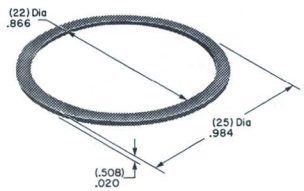


AT073
Mounting Nut
Nickel/brass
Series: HB

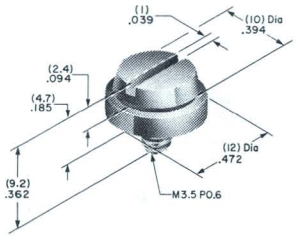
AT074 Mounting Nut for LB Panel Seal
Chromate/brass
Series: LB



AT075
O-ring for LB Panel Seal
Nitrile butadiene rubber (NBR)
Series: LB

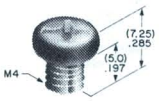


AT080 Screw Adaptor for AT452 & AT454
Brass
Series: MB SCB

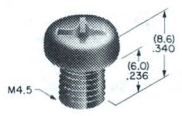


AT082A
Terminal Screw
Brass
Series: S30 S40 S300

AT082B
Terminal Screw
Brass
Series: S400 S500

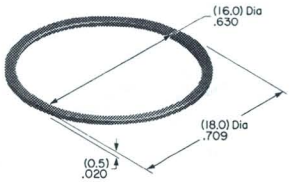


AT082C
Terminal Screw
Brass
Series: S800

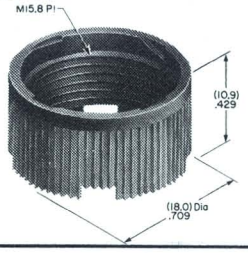


AT085
O-ring
Nitrile butadiene rubber
Series: DRA

AT089
O-ring for YB Panel Seal
Nitrile butadiene rubber (NBR)
Series: YB

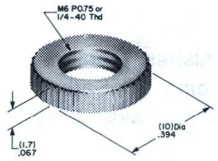


AT092
Knurled Mounting Nut
Polyphenylene oxide
Series: YB

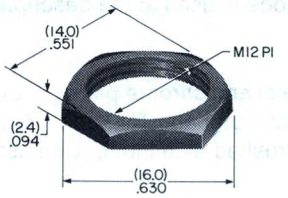


HARDWARE

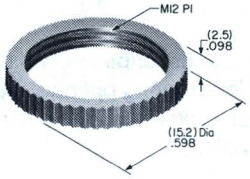
AT501 (M-metric H-inch)
Knurled Face Nut
Chrome/brass



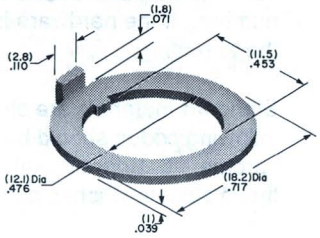
AT503
Hex Face Nut
Chrome/brass



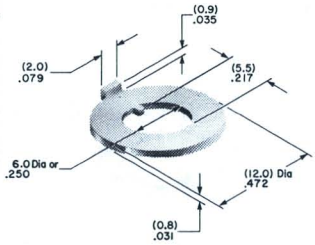
AT504
Knurled Face Nut
Chrome/brass



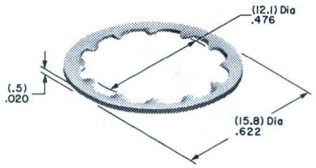
AT506
Locking Ring
Chromate/zinc/steel



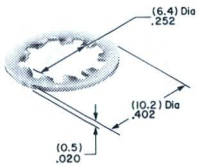
AT507 (M-metric H-inch)
Locking Ring
Chromate/zinc/steel



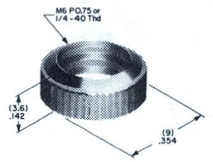
AT508
Internal Tooth Lockwasher
Chromate/zinc/steel



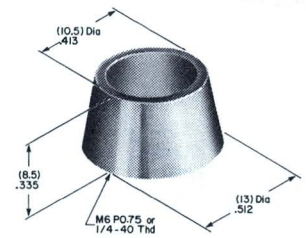
AT509
Internal Tooth Lockwasher
Chromate/zinc/steel



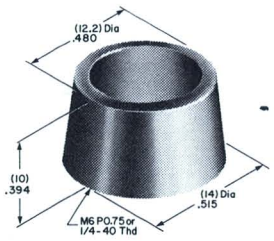
AT511 (M-metric H-inch)
Knurled Cap Nut
Chrome/brass



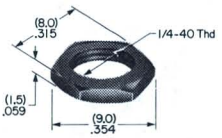
AT512 (M-metric H-inch)
Conical Nut
Chrome/brass



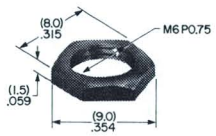
AT512C (M-metric H-inch)
Conical Nut
Chrome/brass



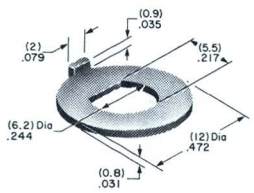
AT513H
Hex Nut
Nickel/brass



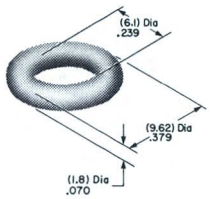
AT513M
Hex Nut
Nickel/brass



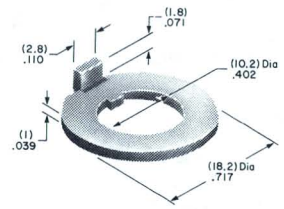
AT515
Locking Ring for D Flat Bushing
Chromate/zinc/steel



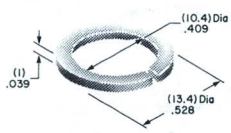
AT516
O-ring
Nitrile butadiene rubber (NBR)
Series: M MB



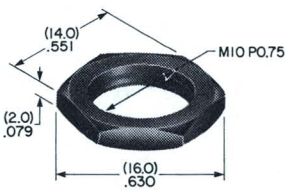
AT518
Locking Ring
Chromate/zinc/steel



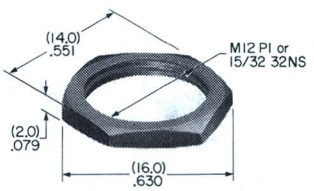
AT520
Lockwasher
Chromate/zinc/steel



AT526
Hex Mounting Nut
Nickel/steel



AT527 (M-metric H-inch)
Hex Mounting Nut
Nickel/steel



Supplement

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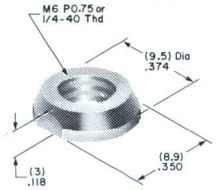
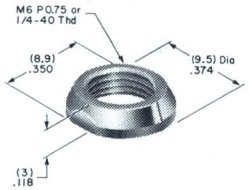
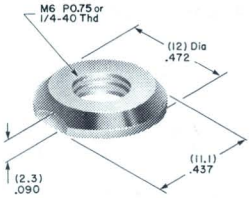
AT532 (M-metric H-inch)
Dress Cap Nut
Nickel/brass



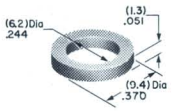
AT532T (M-metric H-inch)
Threaded Through Dress Nut
Nickel/brass



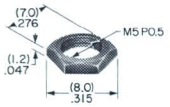
AT533T (M-metric H-inch)
Threaded Through Dress Nut
Nickel/brass



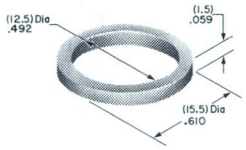
AT535
Washer for MR Panel Seal
Nitrile butadiene rubber (NBR)
Series: MR



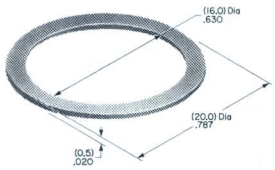
AT536
Hex Nut for FB
Nickel/brass
Series: FB



AT537
O-ring
Nitrile butadiene rubber (NBR)
Series: M TL



AT541
O-ring for Panel Seal with Splash Cover
Nitrile butadiene rubber (NBR)
Series: YB



UL RECOGNITION

UNDERWRITERS LABORATORIES INC. FILE E44145

Important
Switches are supplied without UL marking unless specified.
To order UL mark on switch, add a /U to end of part number.

Symbol used below: + = any following #s or letters.

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Address: 1655 Scott Boulevard
Santa Clara, California 95050.

SERIES	POLE & THROW	RATING
DLB214+	DPDT	5A @ 125V AC
E201+	SPST SPDT	3A @ 125V AC
E202+	DPST DPDT	3A @ 125V AC
EB2011 EB2061 EB2065 EB2085	SPDT DPDT SPDT DPDT	3A @ 125V AC
FBANP2 FBANEP2	SPST	500mA @ 125V AC
HB+	SPDT	0.1A @ 30V AC/DC
HS16	SP ~ 6P	12A @ 125V AC, 6A @ 250V AC
JWM	SPST SPDT DPST DPDT	10A @ 250V AC
KB+	SPDT DPDT	1A @ 125/250V AC, 1A @ 30V DC 0.4VA @ 28V AC/DC
LB15+ LB16+	SPDT	3A @ 125/250V AC 0.4VA @ 28V AC/DC
LB25+ LB26+	DPDT	3A @ 125/250V AC 0.4VA @ 28V AC/DC
LW312+	DPDT	10A @ 125V AC, 6A @ 250V AC
M+ or M20+ Toggles	SPST SPDT SP3T DPST DPDT DP3T 3PDT 4PDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC
M+ or M20+ Rockers	SPDT SP3T DPDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC
M211+	SPDT	6A @ 125V AC
M2B	SPDT DPDT	1A @ 125V AC, 1A @ 30V DC 0.4VA @ 28V AC/DC
M2T+	SPDT DPDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC
MB2+ (MB2000)	SPDT DPDT 4PDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC
MB24+ (MB2400)	SPDT DPDT	3A @ 125V AC 0.4VA @ 28V AC/DC
MLW302+	DPDT	5A @ 125V AC
MRT2+	DPDT	5-10A @ 125V AC
P20+	SPST SPDT DPST DPDT	10A @ 125V AC, 6A @ 250V AC
PW201+	SPDT	6A @ 125V AC (for PW2012) 5A @ 125V AC (for all others)
PW202+	DPDT	6A @ 125V AC (for PW2022) 5A @ 125V AC (for all others)
S1A	SPST	15A @ 125V AC, 6A @ 250V AC
S1B	SPST	10A @ 125V AC, 5A @ 250V AC
S2A	SPDT	15A @ 125V AC, 6A @ 250V AC
S2B	SPDT	10A @ 125V AC, 5A @ 250V AC
S3A	SPDT	15A @ 125V AC, 6A @ 250V AC
S6A	DPDT	20A @ 125V AC, 10A @ 250V AC
S6B	DPDT	10A @ 125V AC, 5A @ 250V AC
S7B	DPDT	5A @ 125V AC, 3A @ 250V AC
S31+	3PST	18A @ 125V AC, 9A @ 250V AC
S32+	3PDT	18A @ 125V AC, 9A @ 250V AC
S33+	3PDT	18A @ 125V AC, 9A @ 250V AC
S35+	3PDT	15A @ 125V AC, 6A @ 250V AC
S38+	3PDT	15A @ 125V AC, 6A @ 250V AC
S39+	3PDT	15A @ 125V AC, 6A @ 250V AC
S41+	4PST	18A @125V AC, 9A @ 250V AC
S42+	4PDT	18A @125V AC, 9A @ 250V AC
S43+	4PDT	18A @125V AC, 9A @ 250V AC
S45+	4PDT	15A @125V AC, 6A @ 250V AC
S48+	4PDT	15A @125V AC, 6A @ 250V AC
S49+	4PDT	15A @125V AC, 6A @ 250V AC

UL RECOGNITION

UNDERWRITERS LABORATORIES INC. FILE E44145

SERIES	POLE & THROW	RATING
S301+	SPST	15A @ 125V AC, 6A @ 250V AC
S302+	SPDT	15A @ 125V AC, 6A @ 250V AC
S303+	SPDT	15A @ 125V AC, 6A @ 250V AC
S331+	DPST	15/25A @ 125V AC 15/9A @ 250V AC
S332+	DPDT	15/25A @ 125V AC 15A @ 250V AC
S333+	DPDT	15/25A @ 125V AC 15A @ 250V AC
S335+	DPDT	15A @ 125V AC 6A @ 250V AC
S338+	DPDT	15A @ 125V AC 6A @ 250V AC
S339+	DPDT	15A @ 125V AC 6A @ 250V AC
S8+ (S820s)	DPST DPDT	30A @ 125V AC 30A @ 250V AC
S8+ (S830s)	3PST 3PDT	30A @ 125V AC, 30A @ 250V AC
S8+ (S820Ds)	DPST DPDT	30A @ 30V DC, 15A @ 125V DC
S8+ (S830Ds)	3PST 3PDT	30A @ 30V DC, 15A @ 125V D

SERIES	POLE & THROW	RATING
S4012	SPDT	6A @ 125V AC
SB25	DPDT	15A @ 125V AC, 9A @ 250V AC
SB61A	DPDT	10A @ 125V AC, 5A @ 250V AC
SB265 SB265T	SPST SPST	6A @ 125V AC, 3A @ 250V AC 6A @ 125V AC, 3A @ 250V AC
SB285	DPDT	6A @ 125V AC, 3A @ 250V AC
SB401+ (SB4011NO & SB4011NC)	SPST	3A @ 125V AC
SK+	SPDT	3A @ 125V AC (low security models)
SW300+ (SW3001A)	SPST	15A @ 125V AC, 6A @ 250V AC
SW300+ (SW3002A & SW3003A)	SPDT	15A @ 125V AC, 6A @ 250V AC
SW300+ (SW3006A)	DPDT	20A @ 125V AC, 10A @ 250V AC
SW38+ (SW3800s SW3800Ds)	DPST DPDT 3PST 3PDT	30A @ 125/250V AC 15A @ 125V DC 30A @ 30V DC
TL+	SPDT DPDT	6A @ 125V AC 3A @ 250V AC

NKK CSA CERTIFICATION

CANADIAN STANDARDS ASSOCIATION FILE LR23535 & LR56017

Important

Switches are supplied without CSA marking unless specified.
To order CSA mark on switch, add a /C to end of part number.
Abbreviations used below: X = circuit #s,
PC = printed circuit board, WW = wirewrap, QC = quick connect.

Canadian Standards Association is a nonprofit, nongovernmental association which investigates equipment safety & certifies use of CSA marks when a product is in compliance with applicable requirements. Address: 178 Rexdale Blvd. Rexdale (Toronto) Ontario, Canada M9W1R3.

SERIES	POLE THROW	RATING
E201X E202X	SPDT DPDT	3A @ 125V AC (PC, Solder Lug) 3A @ 125V AC (PC only)
EB2011 EB2065	SPDT	3A @ 125V AC (PC, Solder Lug)
EB2061 EB2085	DPDT	3A @ 125V AC (PC only)
JWL	SPST SPDT DPST DPDT	16A @ 250V AC
JWM	SPST SPDT DPST DPDT	10A @ 250V AC
KB	SPDT DPDT	1A @ 125/250V AC, 1A @ 30V DC 0.4VA @ 28V AC/DC
LB	SPDT DPDT	3A @ 125/250V AC 0.4VA @ 28V AC/DC
Toggles M2011 M201X	 SPST SPDT	 6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC (PC, Solder Lug, WW)
M2021 M202X M203X M204X	DPST SP3T DPDT 3PDT DP3T 4PDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC (PC only)
Rockers M201X	 SPDT	 6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC (PC, Solder Lug, WW)
M202X 	SP3T DPDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC (PC only)
M2112 M2113	SPDT	6A @ 125V AC (M2100s with or w/o suffix N or T)
M2B15 M2B25	SPDT DPDT	1A @ 125V AC, 1A @ 30V DC 0.4VA @ 28V AC/DC
M2T	SPDT DPDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC, 4A @ 30V DC
MB2011 MB2065	SPDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC (PC, Solder Lug, WW)
MB2061 MB2085	DPDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC (PC only)
MB2181 MB2185	4PDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC (PC only)
MB2411	SPDT	3A @ 250V AC 0.4VA @ 28V AC/DC (PC, Solder Lug, WW)
MB2461	DPDT	3A @ 250V AC 0.4VA @ 28V AC/DC (PC & WW only)
MLW	DPDT	5A @ 125V AC, 3A @ 250V AC
MS12 MS13	SPDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC (nonilluminated models only)
MS20 MS22 MS23	SP3T DPDT	6A @ 125V AC, 3A @ 250V AC 0.4VA @ 28V AC/DC (nonilluminated models only)
P2011 P2012 P2013	SPST SPDT	10A @ 125V AC 6A @ 250V AC
P2021 P2022 P2023	DPST DPDT	10A @ 125V AC 6A @ 250V AC
PW2012	SPDT	6A @ 125V AC
PW2013 PW2015 PW2018 PW2019	SPDT	5A @ 125V AC
PW2022	DPDT	6A @ 125V AC
PW2025 PW2029	DPDT	5A @ 125V AC
S1A	SPST	15A @ 125V AC, 6A @ 250V AC
S1B	SPST	10A @ 125V AC, 5A @ 250V AC
S2A	SPDT	15A @ 125V AC, 6A @ 250V AC
S3A	SPDT	15A @ 125V AC, 6A @ 250V AC
S6A	DPDT	20A @ 125V AC, 10A @ 250V AC
S6B	DPDT	10A @ 125V AC, 5A @ 250V AC

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NKK CSA CERTIFICATION

CANADIAN STANDARDS ASSOCIATION FILE LR23535 & LR56017

SERIES	POLE THROW	RATING
S7A	DPDT	20A @ 125V AC, 10A @ 250V AC
S7B	DPDT	5A @ 125V AC, 3A @ 250V AC
S32 S32F	3PDT	25A @ 125V AC, 9A @ 250V AC
S32T		15A @ 125V AC, 6A @ 250V AC
S33 S33F	3PDT	25A @ 125V AC, 9A @ 250V AC
S33T		15A @ 125V AC, 6A @ 250V AC
S35 S35F S35T	3PDT	15A @ 125V AC, 6A @ 250V AC
S35B	3PDT	5A @ 125V AC, 3A @ 250V AC
S38 S38F S38T	3PDT	15A @ 125V AC, 6A @ 250V AC
S39 S39F S39T	3PDT	15A @ 125V AC, 6A @ 250V AC
S41 S42 S43	4PST 4PDT	25A @125V AC, 9A @ 250V AC
S41T S42T S43T	4PST 4PDT	15A @125V AC, 6A @ 250V AC
S114 S116	DPST DPDT	5A @ 125V AC, 2A @ 250V AC
S211	SPST	3A @ 125V AC, 1.5A @ 250V AC
S301 S302 S303 S305 S308 S309	SPST SPDT	15A @ 125V AC, 6A @ 250V AC
Also: S301 ~ S309 with suffix F or T at same ratings		
S331 S332 S333	DPST DPDT	25A @ 125V AC, 9A @ 250V AC
S335	DPDT	15A @ 125V AC, 6A @ 250V AC
S532 S533	DPDT	30A @ 125V AC, 15A @ 250V AC
S821 S822 S823	DPST DPDT	30A @ 125/250V AC
S831 S832 S833	3PST 3PDT	30A @ 125/250V AC
S821D	DPST	30A @ 30V DC, 15A @ 125V DC
S822D S823D	DPDT	
S831D S832D S833D	3PST 3PDT	30A @ 30V DC, 15A @ 125V DC
S1001 S1002	SPST DPST	6A @ 125V AC, 3A @ 250V AC
S1051 S1052	SPST DPST	3A @ 125V AC, 1.5A @ 250V AC
SB25	DPDT	15A @ 125V AC, 9A @ 250V AC
SB221NC SB221NO SB221TNC SB221TNO	SPST	3A @ 125V AC, 1.5A @ 250V AC
SB265 SB265T	SPST	6A @ 125V AC, 3A @ 250V AC
SB4011NC SB4011NO	SPST	3A @ 125V AC, 2A @ 250V AC
SK	SPDT	3A @ 125V AC (low security models)
SW3001A SW3002A SW3003A	SPST SPDT	15A @ 125V AC, 6A @ 250V AC
SW3006A	DPDT	20A @ 125V AC, 10A @ 250V AC
SW3007A	DPDT	15A @ 125V AC, 6A @ 250V AC
SW3116	DPDT	5A @ 125V AC, 2A @ 250V AC
SW3211	SPST	3A @ 125V AC, 1.5A @ 250V AC
SW382X	DPST DPDT	30A @ 125/250V AC
SW383X	3PST 3PDT	30A @ 125/250V AC
SW382X w/suffix D	DPST DPDT	30A @ 30V DC, 15A @ 125V DC
SW383X w/suffix D	3PST 3PDT	30A @ 30V DC, 15A @ 125V DC
TL12 TL13	SPDT	6A @ 125V AC, 3A @ 250V AC
TL22 TL23	DPDT	6A @ 125V AC, 3A @ 250V AC
UB	SPDT DPDT	5A @ 125/250V AC, 5A @ 30V DC

WASHABILITY DATA

NKK, a pioneer in the development of washable switches, is ahead of its time as a manufacturer of process sealed switches, which are increasingly in demand because of the advancements in automated PC board processing. NKK's expansive family of washables includes miniature, subminiature, super-subminiature, and micro-subminiature toggles, rockers, pushbuttons, keypads, rotaries, and keylocks.

Over 40 years of quality design experience produced the first washable switches to satisfy the process requirements of PC board soldering and cleaning techniques. As each section of this catalog shows, our process compatible switches incorporate all the features necessary to accomplish washability: epoxy sealed terminals, heat resistant resins, interior rubber o-rings, seals, and sleeves, plus ultrasonic welding. NKK's washable switches meet the Flourinert 85°C (185°F), 60-second immersion test. The following data, along with details given in individual sections of this catalog, have been developed from a comprehensive study of test data, technical literature, and industry practice.

General Processing Specifications

Flux Type Strongly recommended are synthetic fluxes that can be effectively removed with alcohol based solvents. Water soluble flux can be used only if a mild spray wash is used.

Preheat It is advisable that temperatures not exceed 104°C (220°F) for 1 minute maximum.

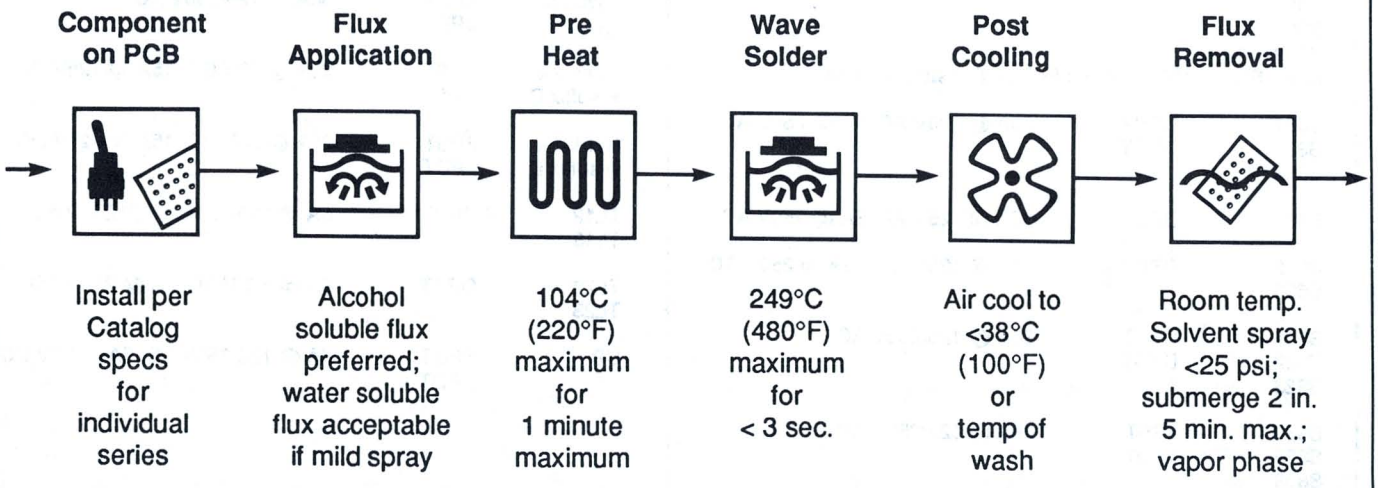
Wave Soldering The solder wave should not be greater than 249°C (480°F), and component travel time through the wave should be less than 3 seconds.

Post-wave Cooling To avoid or minimize thermal shock, switches should be allowed to air cool to below 38°C (100°F) or to the temperature of the cleaning liquid prior to being washed.

Cleaning Solution Alcohol based solutions are most recommended. Aqueous solutions may be used to remove water based flux only if the method of application is a low pressure spray (less than 25 psi) at less than 52°C (125°F) for 5 minutes maximum.

Cleaning Specifications Room temperature. Low pressure spray (less than 25 psi). Submersion depth of 2 inches for maximum time of 5 minutes acceptable if necessary. Vapor cleaning acceptable but not to exceed the time for the switch to reach vapor temperature equilibrium.

Drying In order to eliminate any condensation formed on surfaces after the cleaning process, dry at 52°C (125°F) maximum for approximately 1 hour.



Adherence to the above procedures assures integrity of the product and performance at published specifications.

Supplement

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NKK CONVERSIONS

TEMPERATURE

(Fahrenheit - 32) X .555 = Centigrade

(Centigrade X 1.8) + 32 = Fahrenheit

Fahrenheit - thermometric scale with fixed points marked 32°F (freezing) and 212°F (boiling).

Centigrade - thermometric scale divided into 100 degrees with 0°C freezing point and 100°C boiling point; same as Celsius.

°C	°F	°C	°F	°C	°F
-25	-13	+15	+59	+60	+140
-20	- 4	+20	+68	+65	+149
-17.78	0	+25	+77	+70	+158
-15	+5	+30	+86	+75	+167
-10	+14	+35	+95	+80	+176
-5	+23	+40	+104	+85	+185
0	+32	+45	+113	+90	+194
+5	+41	+50	+122	+95	+203
+10	+50	+55	+131	+100	+212

LINEAR DIMENSIONS

Fraction	Inch	Millimeter	Fraction	Inch	Millimeter	Fraction	Inch	Millimeter
1/32	.031	.08		.157	4.00		.354	9.00
	.039	1.00		.237	6.00		.394	10.00
	.046	1.17	1/4	.250	6.35		.433	11.00
	.079	2.00		.276	7.00	15/32	.469	11.90
	.100	2.54		.280	7.10		.472	12.00
	.118	3.00		.315	8.00	1/2	.500	12.70
	.150	3.81		.350	8.89			

OPERATING FORCE

1 kilogram = 35.7 ounces

1 gram = .03527 ounces

1 Newton = 101.9716 grams

1,000 grams = 9.80665 Newtons

PLATING THICKNESS

1 micron = 1 thousandth of 1 millimeter

1 micron ÷ .0254 = 39.37 millionths of an inch

Example: 3 microns ÷ .0254 = 118.11 millionths of an inch

METRIC TO ENGLISH CONVERSIONS FOR MOUNTING TORQUE

Kilogram/Centimeter to Foot/Pound
1 kg/cm X .01 = .01 kg/m
.01 kg/m X 7.233 = .0723 ft/lbs

Kilogram/Centimeter to Inch/Pound
1 kg/cm X 2.2046 X .3937 = .867951 in/lbs

Gram/Centimeter to Ounce/Inch
1 g/cm ÷ 2.54 ÷ 28.4 = .0138 oz/in

METRIC SYSTEM TERMS

Symbol	Prefix	Meaning	Quantity
μ	micro	one millionth	.000001 or 10^{-6}
m	milli	one thousandth	.001 or 10^{-3}
c	centi	one hundredth	.01 or 10^{-2}
d	deci	one tenth	.1 or 10^{-1}
da	deca	ten	10.0 or 10
h	hecto	one hundred	100.0 or 10^{2}
k	kilo	one thousand	1,000.0 or 10^{3}
M	mega	one million	1,000,000.0 or 10^{6}
G	giga	one billion	1,000,000,000.0 or 10^{9}

CANDLEPOWER

MSCP X 4π = lumens

4π is approximately 12.6

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ELECTRICAL DATA

RERATING LAMPS

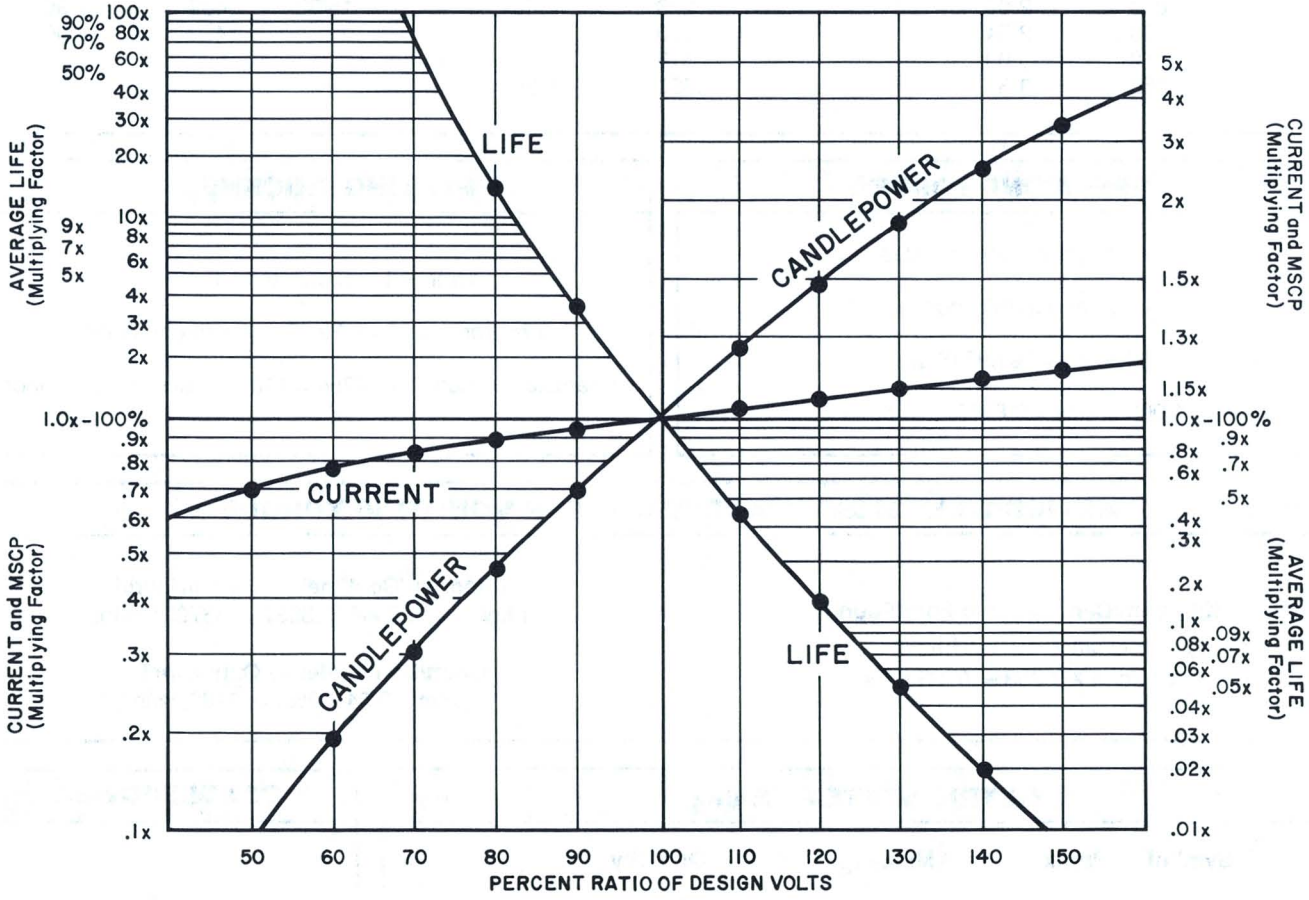
When a lamp is to be operated at a voltage other than the rated or design voltage, the rerated lamp specifications should be calculated to determine suitability for the user's application. The following formulas assist in predicting the rerated effect on luminous intensity, endurance and current. Results are most reliable for applied voltages close to the rated voltage.

$$\text{Rerated MSCP} = \text{Rated MSCP} \times \left[\frac{\text{Applied Voltage}}{\text{Rated Voltage}}\right]^{3.5}$$

$$\text{Rerated Life} = \text{Rated Life} \times \left[\frac{\text{Rated Voltage}}{\text{Applied Voltage}}\right]^{12}$$

$$\text{Rerated Current} = \text{Rated Current} \times \left[\frac{\text{Applied Voltage}}{\text{Rated Voltage}}\right]^{.55}$$

For your convenience, the graph below illustrates the way current, candlepower and life performance vary with percent changes in applied voltage. The graphed values are typical for miniature and subminiature lamps with the average life based on rated voltages at 60 cycles AC, in room temperature, and under static conditions.



Source: General Instrument Chicago Miniature Brand Incandescent and Neon Lamps, Catalog No. 8400-Rev 1, (Chicago, Illinois: General Instrument Corporation), p. 3.

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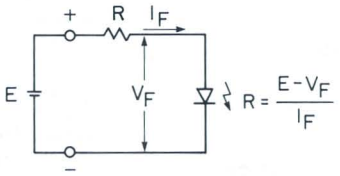
LAMP SPECIFICATIONS

USE OF BALLAST RESISTOR

If the source voltage is greater than the rated voltage of a lamp or LED, a ballast resistor must be connected in series with the lamp. The following circuit diagram and formula will assist in calculating the value of the required ballast resistor.



Where:
- R = Resistor Value (Ohms)
- E = Source Voltage (V)
- V_F = Forward Voltage (V)
- I_F = Forward Current (mA)

RECOMMENDED RESISTORS FOR LEDS @ 25°C

FORWARD VOLTAGE	FORWARD CURRENT	SOURCE VOLTAGE E																	
V_F	I_F	5V		6V		9V		12V		14V		16V		18V		22V		24V		28V	
V	mA	Ω	W	Ω	W	Ω	W	Ω	W	Ω	W	Ω	W	Ω	W	Ω	W	Ω	W	Ω	W
1.65	25	130	1/4	180	1/2	300	1/2	430	1	510	1	560	1	680	2	820	2	910	2	1.1K	2
1.7	30	110	1/2	150	1/2	240	1	360	1	430	1	470	2	560	2	680	2	750	2	910	3
1.75	40	82	1/2	110	1/2	180	1	270	1	300	2	360	2	430	2	510	3	560	3	680	3
1.88	16	200	1/4	270	1/4	470	1/2	620	1/2	750	1/2	910	1	1.0K	1	1.3K	1	1.5K	1	1.8K	2
1.9	8	390	1/8	510	1/8	910	1/4	1.2K	1/4	1.5K	1/2	1.8K	1/2	2.0K	1	2.4K	1/2	2.7K	1/2	3.3K	1
	15	220	1/8	270	1/4	470	1/2	680	1/2	820	1/2	910	1	1.1K	1	1.3K	1	1.5K	1	1.8K	2
	16	200	1/4	270	1/4	470	1/2	620	1/2	750	1/2	910	1	1.0K	1	1.3K	1	1.5K	1	1.6K	2
1.95	15	200	1/4	270	1/4	470	1/2	680	1/2	820	1/2	910	1	1.1K	1	1.3K	1	1.5K	1	1.8K	1
	16	200	1/4	220	1/4	430	1/2	620	1/2	750	1	910	1	1.0K	1	1.2K	1	1.3K	1	1.6K	2
1.96	24	130	1/4	160	1/2	300	1	430	1	510	1	560	1	680	2	820	2	910	2	1.0K	2
2.0	20	150	1/4	200	1/4	360	1/2	510	1	620	1	750	1	820	1	1.0K	2	1.1K	2	1.3K	2
	24	120	1/4	160	1/2	300	1/2	430	1	510	1	560	1	680	2	820	2	910	2	1.1K	2
	25	120	1/4	160	1/2	270	1/2	390	1	510	1	560	1	680	2	820	2	910	2	1.1K	2
2.01	24	120	1/4	160	1/2	300	1	430	1	510	1	560	1	680	2	820	2	910	2	1.0K	2
2.02	24	120	1/4	160	1/2	300	1/2	430	1	510	1	560	1	680	2	820	2	910	2	1.1K	2
2.07	16	180	1/4	240	1/4	430	1/2	620	1/2	750	1	910	1	1K	1	1.2K	1	1.3K	1	1.6K	2
2.1	15	200	1/4	270	1/4	470	1/2	680	1/2	820	1	910	1	1.1K	1	1.3K	1	1.5K	1	1.8K	1
	20	150	1/4	200	1/4	360	1/2	510	1	620	1	560	1	820	1	1.0K	2	1.1K	2	1.3K	2
	25	120	1/4	160	1/2	270	1/2	390	1	470	1	560	1	620	2	820	2	910	2	1.1K	2
	30	100	1/4	130	1/2	240	1	330	1	390	1	470	2	510	2	680	2	750	2	910	2
	45	68	1/2	91	1/2	150	1	220	2	270	2	300	2	360	2	430	3	510	3	560	4
2.15	16	180	1/4	240	1/4	430	1/2	620	1/2	750	1	910	1	1K	1	1.2K	1	1.3K	1	1.6K	2
2.16	16	180	1/4	240	1/4	430	1/2	620	1/2	750	1	910	1	1K	1	1.2K	1	1.3K	1	1.6K	2
2.2	20	150	1/4	200	1/4	360	1/2	510	1	620	1	680	1	820	1	1.0K	2	1.1K	2	1.3K	2
	30	91	1/2	130	1/2	220	1	330	1	390	1	470	2	510	2	680	2	750	2	820	3
2.35	40	68	1/2	91	1/2	160	1	240	1	300	2	330	2	390	2	510	3	560	3	620	3
2.8	20	110	1/4	160	1/4	330	1/2	470	1/2	560	1	680	1	750	1	1.0K	1	1.1K	2	1.3K	2
	25	91	1/4	130	1/4	240	1/2	390	1	470	1	560	1	620	1	750	2	820	2	1.0K	2
3.9	30	36	1/4	75	1/4	180	1/2	270	1	330	1	390	1	470	2	620	2	680	2	820	2
4.2	30	27	1/4	62	1/4	160	1/2	270	1	330	1	390	1	470	2	620	2	680	2	820	2

The watt recommendation listed above provides a margin to maintain ambient temperature levels and increase life.

NKK LAMP SPECIFICATIONS

The electrical specifications shown in the following tables are determined at a basic temperature of 25°C.
Lamp circuits are independent of switch operation, except in the M2100 switches.

Ballast resistor information is given on the previous page.

AT070 Single Element LED for AT208 Bezel

Colors		Red	Green
Forward Peak Current	I_{FM}	25mA	30mA
Continu's Fwd Current	I_F	20mA	20mA
Forward Voltage	V_F	2.8V	2.2V
Reverse Peak Voltage	V_{RM}	4V	4V
Current Reduction Rate	ΔI_F	0.33	0.40
Above 25°C		mA/°C	mA/°C
Ambient Temp Range		-10°C ~ +70°C	-25°C ~ +85°C

AT602 Incandescent & AT602N Neon for MLW & LW Series

		Incandescent					Neon
Voltage	V	6V	12V	18V	24V	28V	110V
Current	I	80mA	50mA	35mA	25mA	22mA	1.5mA
MSCP		.159	.215	.398	.215	.247	NA
Endurance	Hours	2,000	2,000	2,000	2,000	2,000	25,000
Ambient Temp Range		-10°C ~ +50°C					
Recommended Resistors for Neon:		33K ohms for 110V AC 100K ohms for 220V AC					

AT604 Incandescent & AT604N Neon for DLB Series

		6V	14V	28V	110V
Voltage	V				
Current	I	200mA	80mA	40mA	1.5mA
MSCP		.340	.500	.340	NA
Endurance	Hours	1,000	750	1,000	10,000
Ambient Temp Range		-10°C ~ +50°C			
Recommended Resistors for Neon:		33K ohms for 110V AC 100K ohms for 220V AC			

AT606 Single Element LED for MLW Series

Colors		Red	Green
Forward Peak Current	I_{FM}	25mA	30mA
Continuous Forward Current	I_F	20mA	25mA
Forward Voltage	V_F	2.8V	2.8V
Reverse Peak Voltage	V_{RM}	4V	4V
Current Reduction Rate	ΔI_F	0.33	0.40
Above 25°C		mA/°C	mA/°C
Ambient Temp Range		-15°C ~ + 50°C	

AT607 Incandescent & AT607N Neon for LB Series

		Incandescent			Neon
Voltage	V	5V	12V	28V	110V
Current	I	115mA	60mA	24mA	1.5mA
MSCP		.150	.150	.150	NA
Endurance	Hours	7,000	7,000	7,000	10,000
Recommended Resistors for Neon:		33K ohms for 110V AC 100K ohms for 220V AC			
Ambient Temp Range		-15°C ~ + 50°C			

AT611 Incandescent for KB & YB Series

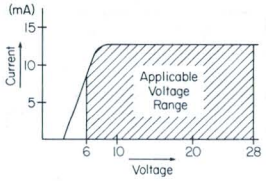
		5V	12V	28V
Voltage	V			
Current	I	115mA	60mA	24mA
MSCP		.150	.150	.150
Endurance	Hours	7,000	7,000	7,000
Ambient Temp Range		-15°C ~ +50°C		

AT612 Double Element LED for KB Series

Colors		Red	Yellow	Green
Forward Peak Current	I_{FM}	20mA	20mA	20mA
Continuous Forward Current	I_F	13mA	13mA	13mA
Forward Voltage	V_F	6-28V	6-28V	6-28V
Forward Peak Voltage	V_{FM}	30V	30V	30V
Reverse Peak Voltage	V_{RM}	30V	30V	30V
Current Variable Rate	ΔI_F	V_F = 10 ~ 24V ±20%		
Ambient Temp Range		-15°C ~ +50°C		

Built-in IC Chip

A built-in IC chip maintains constant current when used within a 6-28V range. Voltage surges beyond 28 volts will burn down the IC chip. The IC chip's regulation of voltage eliminates the need for a ballast resistor and results in a low current consumption of 13mA average, as illustrated in the accompanying graph. Double elements in the LED result in brighter intensity.



AT614 Single Element LED for KB & LB Series

Colors		Red	Yellow	Green
Forward Peak Current	I_{FM}	50mA	50mA	50mA
Continuous Forward Current	I_F	40mA	40mA	40mA
Forward Voltage	V_F	1.75V	2.35V	2.35V
Reverse Peak Voltage	V_{RM}	4V	4V	4V
Current Reduction Rate	ΔI_F	0.67	0.67	0.67
Above 25°C		mA/°C	mA/°C	mA/°C
Ambient Temp Range		-15°C ~ +50°C		

AT615 Neon for KB Series

		110V
Voltage	V	
Current	I	1.5mA
Endurance	Hours	10,000
Recommended Resistors for Neon:		33K ohms for 110V AC 100K ohms for 220V AC
Ambient Temp Range		-15°C ~ + 50°C

AT616 Single Element LED for HB Series

Colors		Red	Yellow	Green
Forward Peak Current	I_{FM}	30mA	20mA	30mA
Continuous Forward Current	I_F	24mA	16mA	24mA
Forward Voltage	V_F	2.04V	1.88V	2.02V
Reverse Peak Voltage	V_{RM}	5V	5V	5V
Current Reduction Rate	ΔI_F	0.40	0.26	0.40
Above 25°C		mA/°C	mA/°C	mA/°C
Ambient Temp Range		-20°C ~ +50°C		

AT617 Single Element LED for AT212 Bezel

Colors		Red	Yellow	Green
Forward Peak Current	I_{FM}	30mA	20mA	30mA
Continuous Forward Current	I_F	24mA	16mA	24mA
Forward Voltage	V_F	2.04V	1.88V	2.02V
Reverse Peak Voltage	V_{RM}	5V	4V	5V
Current Reduction Rate	ΔI_F	0.40	0.27	0.40
Above 25°C		mA/°C	mA/°C	mA/°C
Ambient Temp Range		-15°C ~ +70°C		

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Note that neon lamps can be used with red, yellow, clear, or white caps and filters only.
MSCP = Mean Spherical Candle Power.

AT618 Single Element LED for Spot Illuminated LB & AT213 Bezel

		Single Color			Bicolor
Colors		Red	Yellow	Green	Red/Green
Forward Peak Current	I_{FM}	10mA	20mA	30mA	50mA
Continuous Forw'd Current	I_F	8mA	16mA	24mA	25mA
Forward Voltage	V_F	1.9V	1.9V	2.0V	2.0V
Reverse Peak Voltage	V_{RM}	5V	4V	5V	------
Current Reduction Rate	ΔI_F	0.13	0.27	0.40	0.67
Above 25°C		mA/°C	mA/°C	mA/°C	mA/°C
Ambient Temp Range			-15°C ~ +50°C		-10°C ~ +55°C

AT620 Single Element LED for YB Series

Colors		Red	Yellow	Green
Forward Peak Current	I_{FM}	40mA	40mA	40mA
Continuous Forward Current	I_F	30mA	30mA	30mA
Forward Voltage	V_F	3.9V	3.9V	4.2V
Reverse Peak Voltage	V_{RM}	8V	8V	8V
Current Reduction Rate	ΔI_F	0.50	0.50	0.50
Above 25°C		mA/°C	mA/°C	mA/°C
Ambient Temp Range			-15°C ~ +50°C	

AT621 Single Element LED (Bicolor Red/ Green) for YB Series

		w/oResist'r	w/Built-in Resistor		
LED Voltage Codes		02	05	12	24
Forward Peak Current	I_{FM}	60mA	60mA	20mA	12mA
Continuous Forw'd Current	I_F	45mA	45mA	15mA	10mA
Forward Voltage	V_F	2.1V	5V	12V	24V
Reverse Peak Voltage	V_{RM}	Not applicable to bicolor			
Current Reduction Rate	ΔI_F	0.8	-----	-----	-----
Above 25°C		mA/°C			
Ambient Temp Range			-15°C ~ +50°C		

Single Element LED for YB Series Spot Illuminated Cap

		w/oResist'r	w/Built-in Resistor		
LED Voltage Codes		02	05	12	24
Forward Peak Current	I_{FM}	20mA	15mA	15mA	12mA
Continuous Forw'd Current	I_F	15mA	12.5mA	12.5mA	10mA
Forward Voltage	V_F	2.1V	5V	12V	24V
Reverse Peak Voltage	V_{RM}	5V	5V	5V	5V
Reverse Peak Voltage not applicable to bicolor.					
Current Reduction Rate	ΔI_F	0.27	-----	-----	-----
Above 25°C		mA/°C			
Ambient Temp Range			-15°C ~ +50°C		

Single Element LED for DLB Series

Colors		Red	Green
Forward Peak Current	I_{FM}	35mA	30mA
Continuous Forward Current	I_F	25mA	20mA
Forward Voltage	V_F	1.65V	2.0V
Reverse Peak Voltage	V_{RM}	3V	3V
Current Reduction Rate	ΔI_F	0.57	0.43
Above 25°C		mA/°C	mA/°C
Ambient Temp Range		-10°C ~ +50°C	

Single Element LED for JB & UB Series

Colors		Red	Yellow	Green
Forward Peak Current	I_{FM}	30mA	20mA	20mA
Continuous Forward Current	I_F	20mA	15mA	15mA
Forward Voltage	V_F	2.0V	1.9V	1.95V
Reverse Peak Voltage	V_{RM}	5V	5V	5V
Current Reduction Rate	ΔI_F	0.40	0.27	0.27
Above 25°C		mA/°C	mA/°C	mA/°C
Ambient Temp Range			-25°C ~ +70°C	

Single Element LED for JF Series

Colors		Red	Yellow	Green
Forward Peak Current	I_{FM}	40mA	40mA	40mA
Continuous Forward Current	I_F	30mA	30mA	30mA
Forward Voltage	V_F	1.7V	2.2V	2.2V
Reverse Peak Voltage	V_{RM}	4V	4V	4V
Current Reduction Rate	ΔI_F	0.67	0.67	0.67
Above 25°C		mA/°C	mA/°C	mA/°C
Ambient Temp Range			-25°C ~ +70°C	

Single Element LED for M2100 Toggles & Rockers

Colors		Red	Yellow	Green	Bicolor
Forward Peak Current	I_{FM}	25mA	30mA	30mA	25mA
Continuous Forw'd Current	I_F	20mA	20mA	20mA	20mA
Forward Voltage	V_F	2.1V	2.1V	2.1V	2.1V
Reverse Peak Voltage	V_{RM}	4V	4V	4V	------
Current Reduction Rate	ΔI_F	0.33	0.40	0.40	0.33
Above 25°C		mA/°C	mA/°C	mA/°C	mA/°C
Ambient Temp Range			-10°C ~ +55°C		

Single Element LED for M2100 Paddles

Colors		Red	Yellow	Green	Bicolor
Forward Peak Current	I_{FM}	10mA	20mA	30mA	50mA
Continuous Forw'd Current	I_F	8mA	16mA	24mA	25mA
Forward Voltage	V_F	1.9V	1.9V	2.0V	2.1V
Reverse Peak Voltage	V_{RM}	5V	4V	5V	------
Current Reduction Rate	ΔI_F	0.13	0.27	0.40	0.67
Above 25°C		mA/°C	mA/°C	mA/°C	mA/°C
Ambient Temp Range			-25°C ~ +70°C		

Single Element LED for MS & SS Series

Colors		Red	Yellow	Green
Forward Peak Current	I_{FM}	20mA	20mA	20mA
Continuous Forw'd Current	I_F	16mA	16mA	16mA
Forward Voltage	V_F	2.07V	2.15V	2.16V
Reverse Peak Voltage	V_{RM}	3V	4V	4V
Current Reduction Rate	ΔI_F	0.27	0.27	0.27
Above 25°C		mA/°C	mA/°C	mA/°C
Ambient Temp Range			-15°C ~ +70°C	

Single Element LED for TL Series

Colors		Red	Yellow	Green
Forward Peak Current	I_{FM}	30mA	50mA	50mA
Continuous Forw'd Current	I_F	20mA	20mA	20mA
Forward Voltage	V_F	2.0V	2.1V	2.1V
Reverse Peak Voltage	V_{RM}	4V	4V	4V
Current Reduction Rate	ΔI_F	0.33	0.67	0.67
Above 25°C		mA/°C	mA/°C	mA/°C
Ambient Temp Range			-10°c ~ +55°C	

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NKK ELECTRICAL DATA

FACTORS FOR CALCULATING RERATED CURRENT AT VARIOUS LOADS

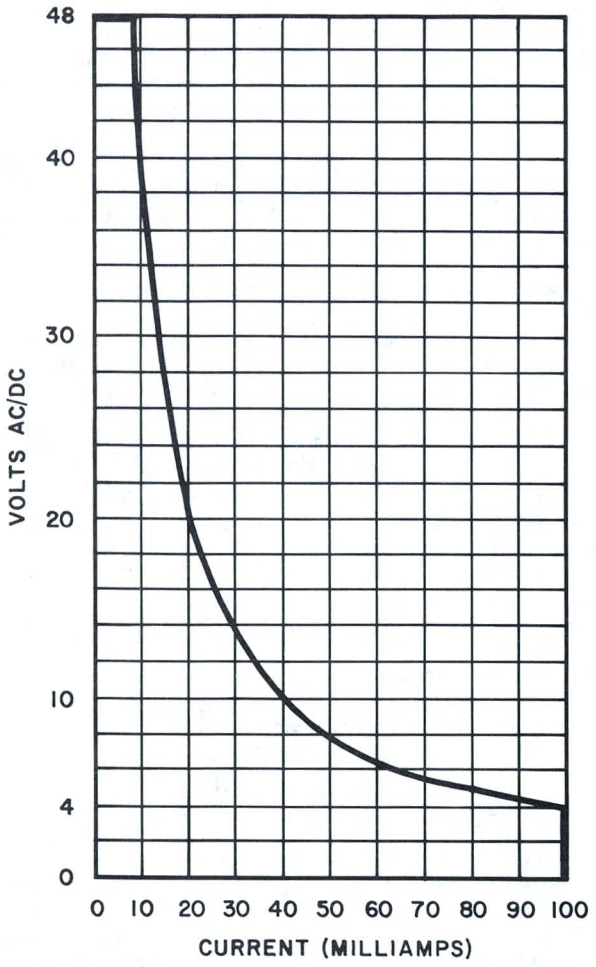
Original Rated Load	Resistive Load	Inductive Load	Lamp Load	Motor Load
125V AC	1.0	0.66	0.25	0.33
250V AC	0.66	0.33	0.16	0.22
12V DC	1.25	1.0	0.31	0.41
30V DC	1.0	0.5	0.25	0.33
48V DC	0.33	0.25	0.08	0.11
125V DC	0.05	0.03	----------	----------

Sample Calculation: A switch with a resistive rating of 6A @ 125V AC could be used with an inductive rating of 3 - 4A (6 X 1/2 = 3 and 6 X 2/3 = 4).

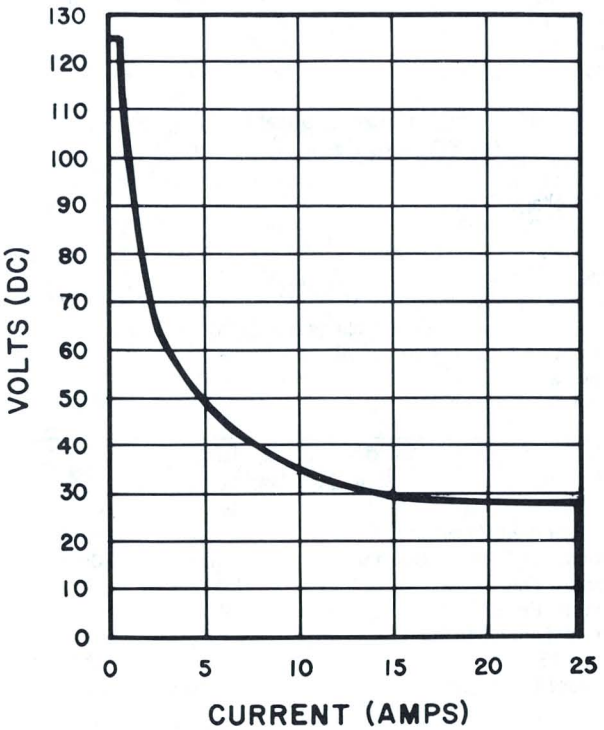
Rerated values are general & should allow optimum life, dependent upon application. They are not guaranteed values.

OPERATING RANGE (APPLICATION DEPENDENT)

0.4VA RATED SWITCHES (LOGIC LEVEL)



DC CAPACITY
SERIES S300 RATED 15A @ 125V AC RESISTIVE LOAD



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GLOSSARY

GLOSSARY OF TERMS & ACRONYMS

~ ~ ~ **A** ~ ~ ~

ABS — Acrylonitrile Butadiene Styrene; a thermoplastic composed of styrene and acrylic resin which provides shatterproofing and a shiny appearance; it is resilient and can be easily metal plated.

AC — Alternating Current; electric current that continually reverses direction at a fixed frequency.

alloy — a metal created by combining two or more different metals to obtain a desired physical property.

alternate action — commonly describing pushbutton switches; remaining in a given circuit condition after removal of actuating force; when actuating force is applied a second time, the opposite circuit is engaged; also known as push-push switching action; may or may not be latchdown.

ambient temperature range — operating temperature range.

angle of throw — used with rockers and toggles to indicate total travel arc measured in degrees.

annealed — relieved of mechanical stress through the application of heat and gradual cooling; for example, annealed copper is less brittle.

ANSI — American National Standards Institute; a standard-setting agency of the United States which approves the design and/or performance of electrical/electronic components that are distributed in the world market.

arcing — the flow of electric current between opening or closing switch contacts.

~ ~ ~ **B** ~ ~ ~

bifurcated contact — a two-pronged, wiping movable contact.

bounce — the repeated rebounding of the movable contact during the transfer from one throw to the next; measured in milliseconds.

brass — an alloy of zinc and copper.

break before make — interrupting one circuit of a pole before completing another of the same pole (nonshorting contact).

~ ~ ~ **C** ~ ~ ~

capacitive load — a load in which the initial current on make is higher than steady state; upon break it is less than steady state. Current leads voltage in capacitive loads.

clad — the joining of two dissimilar materials by welding or bonding.

contact resistance — the resistance across a pair of closed contacts which is in series with the load; this resistance increases with the age of the switch at a rate varied by environment, frequence of use, voltage, and load conditions; measured in milliohms.

creepage — the unwanted flow of electrical current from one conductive part to another.

CSA — Canadian Standards Association.

cycle — the complete sequence of indexing through all successive switch positions and returning to the original position.

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GLOSSARY

GLOSSARY OF TERMS & ACRONYMS

~ ~ ~ **D** ~ ~ ~

DC — Direct Current; electric current that flows only in one direction.

detent — a mechanical positioning device for stopping actuator travel at each successive electrical circuit; for example, a spring-operated ball and groove.

dielectric strength — the ability of an insulating material to withstand high voltage without electrical degradation.

differential travel — the distance an actuator moves between the point where contacts snap over and where they snap back, or where a contact makes and then breaks.

DIP — Dual Inline Package, indicating .100" center-to-center terminal spacing and .300" row-to-row spacing.

double break — having two pairs of contacts (shorting bar) that open the circuit at two places; having this added contact material improves heat dissipation and increases life; desirable in DC circuit applications.

DP — Double Pole; see pole.

dry circuit — a low energy circuit condition where no arcing occurs during contact switching; for example 0.4VA maximum @ 28V AC/DC maximum; see logic level.

DSP — National Defense Standards of Japan; NKK file numbers C 6310B & C 6313.

DT — Double Throw; see throw.

~ ~ ~ **F** ~ ~ ~

flash plating — a very thin or "instant plating" of usually less than 10 microinches in thickness.

flux — chemical used for cleaning metal surfaces so that solder will flow out on the metal; fluxes change a passive, contaminated metal surface into an active, clean, solderable surface.

~ ~ ~ **G** ~ ~ ~

gull wing — a type of surface mount terminal which extends from the side of the switch and has an L-shaped bend at the end.

~ ~ ~ **I** ~ ~ ~

inductive load — a load in which the initial current on make is lower than steady state and upon break is greater than steady state. The long arcing time, due to stored energy in the inductor at the time of breaking, is severe on the switch contacts.

IEC — International Electrotechnical Commission
3 Rue de Varembe
P. O. Box 131
1211 Geneva 20, Switzerland

IECQ — IEC's Quality Assessment System for Electronic Components, created in 1983 to facilitate national and international trade in certified electronic components; a worldwide certification system which provides a method whereby electronic components made and handled by approved manufacturers and distributors can be used anywhere without further testing.

infrared reflow — a method of mass soldering surface mount devices with some form of infrared (IR) thermal radiation, such as a lamp IR system where PCB and components are heated largely by radiant energy from IR lamps.

GLOSSARY

GLOSSARY OF TERMS & ACRONYMS

inrush — the initial, transitory high-level of current through contacts upon making (closing); can cause severe degradation of contacts; applicable to resistive and capacitive loads.

IP — part of the IEC529 standard recommending the degree of protection of enclosures for low-voltage switch gear; specifically, concerned with protection of persons against contact with live or moving parts and the prevention of ingress of solid foreign bodies and liquid; an industrial specification used internationally and similar to NEMA.

insulation resistance — the electrical resistance between two normally insulated parts; measured at a specific high potential; usually greater than 1 megohm.

isolated lamp circuit — independent of switching circuit; lamp is operated on a circuit separate from the switch circuit.

~ ~ ~ **J** ~ ~ ~

JETL — Japan Electrical Testing Laboratory.

JIS — Japan Industrial Standard; Japan Industrial Standards Committee (JISC) Agency of Industrial Science and Technology.

~ ~ ~ **L** ~ ~ ~

lamp load (tungsten) — most notably characterized by the high inrush current at make (approximately 10 to 16 times the steady state).

latchdown — one type of alternate action in which the pushbutton is mechanically fastened in the down position; the pushbutton is at "normal" position for one circuit and latched down position for the other circuit condition.

LED — Light Emitting Diode; provides illumination with advantages of long life and low power consumption.

logic level — an application in which power levels do not cause arcing, melting, or softening of contacts; also referred to as dry circuit or low energy; specificied 0.4VA max @ 28V AC/DC max; typically requiring gold contacts for reliability.

~ ~ ~ **M** ~ ~ ~

maintained action — remaining in a given circuit condition until actuated to the opposite circuit condition where it is again maintained; opposite momentary action.

make before break — completing one circuit of a pole before interrupting another of the same pole (shorting contact).

MITI — Ministry of Industry & Trade Institute (Japan).

momentary action — mechanically returning from a temporary circuit condition to the normal circuit condition as soon as the actuating force is removed.

MSCP — Mean Spherical Candle Power; a unit of measure of light intensity.

~ ~ ~ **N** ~ ~ ~

NBR — Nitrile Butadiene Rubber, a copolymerization of nitrile and butadiene which is used mainly to meet oilproof requirements of o-rings and switch boots or covers.

NC — Normally Closed contacts; circuit is closed when actuator is in relaxed or normal position.

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NEMA National Electrical Manufacturers Association, an agency of the United States setting standards for products distributed worldwide; applied to switches in their degrees of protection against the intrusion of liquids, dust, and other contaminants.

Newton the unit of measure for operating force abbreviated N; see the conversion tables in the previous subsection.

NO Normally Open contacts; circuit is open when actuator is in relaxed or normal position; applies to momentary or alternate action switches.

nominal the result of the calculated actual value range.

nonshorting contacts contacts which break before make; usually much higher than the switching rating.

nonswitching rating the power carrying capability of a switch after contact closure and at the end of contact bounce.

~ ~ ~ O ~ ~ ~

opaque condition that prevents the passage of light.

overtravel the distance an actuator moves beyond the point at which electrical contacts transfer.

~ ~ ~ P ~ ~ ~

panel seal liquid is prevented from reaching the switch contacts from the front of the panel if the panel is subjected to spills or splashing.

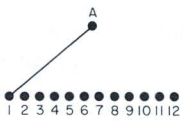
PBT polybutylene terephthalate, a polyester thermoplastic resin compound.

PCB Printed Circuit Board; thin copper traces on a plastic laminate providing low cost, low current mass wiring.

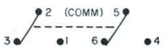
PF Power Factor; a means of determining contact capability when used with inductive loads relative to the standard resistive load rating; for example, if PF = 1.0 the inductive load is 100% of the resistive load, or if PF = 0.6 the inductive load is 60% of the resistive load.

pole a single common electrical input having one or more outputs.

Single Pole (w/1 output)



Single Pole (w/12 outputs)



Double Pole (w/2 outputs)

position the mechanical detents of a switch actuator.

PPS polyphenylene sulfide; a thermoplastic resin which is chemical and flame resistant.

pretravel the distance an actuator moves before a change in the electrical condition is made.

push-push also known as alternate action; is not latchdown.

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GLOSSARY OF TERMS & ACRONYMS

~ ~ ~ R ~ ~ ~

RCJ — Reliability Center for Electronic Components of Japan, member of EXACT (International Exchange of Authenticated Electronic Component Performance Test Data).

resistive load — the easiest load to switch because current and voltage are in a steady state on make and drop instantly to zero on break; produces minimal arcing which maximizes contact life.

RMS — Root Mean Square.

~ ~ ~ S ~ ~ ~

SEMKO — Svenska Elektriska Materielkontrollanstalten of Sweden.

SEV — Schweizerischer Elektrotechnischer Verein of Switzerland.

shorting contacts — contacts which make before break.

silicone rubber — rubber made from silicone elastomers and noted for its retention of flexibility, resilience, and tensile strength over a wide temperature range.

SIP — Single Inline Package, indicating .100" center-to-center terminal spacing with terminals aligned in one row.

snap action — the abrupt transfer of contacts from one position to another; this action is relatively independent of the speed of actuator travel.

SPST — Single Pole Single Throw; see pole, also throw.

STC — Sliding Twin Contact, an NKK-patented mechanism with two movable contact surfaces which pinch the stationary contacts.

surface mount — component terminals are soldered to pads on the surface of the PC boards as opposed to using holes for mounting; terminal shapes vary -- gull wing, J-bend, and others.

synchronous lamp circuit — lamp is operated on a circuit in phase with the switch; the switch contains a separate circuit to open or close the lamp circuit simultaneously with the switching circuit.

~ ~ ~ T ~ ~ ~

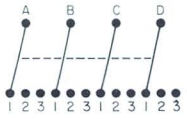
tactile feedback — the switching action felt by an operator.

thermal shock — the state of a component that is undergoing an excessive temperature change, particularly in reference to movement from one process to another in soldering and cleaning.

throw — the number of electrical circuits within a pole.

Single Throw (w/2 poles)

Double Throw (w/1 pole)



Three Throw (w/4 poles)

NKK GLOSSARY

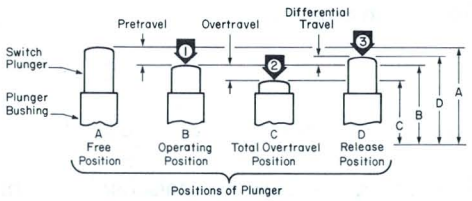
GLOSSARY OF TERMS & ACRONYMS

total travel — sum of pretravel and overtravel; full distance an actuator moves from relaxed position past the point of electrical contact and to the end of travel.

translucent — transmitting and diffusing light so that objects beyond cannot be seen clearly.

transparent — transmitting light without appreciably scattering so that objects lying beyond are entirely visible.

travel — the distance the actuator moves to effect the change of electrical circuits; see also differential travel, pretravel, overtravel, and total travel.



two circuit — circuit in which one circuit is completed in one position and another separate circuit is completed in the other position.

~ ~ ~ **U** ~ ~ ~

UL — Underwriters Laboratories Inc.; many of NKK's switches are UL Recognized.

undercoating — a coating used for preparation of a surface for plating or used to prevent corrosion when the finish plating develops pinholes; thickness of an undercoating is determined by its purpose.

~ ~ ~ **V** ~ ~ ~

vapor phase — a process well-suited to soldering surface mount devices; it combines infrared preheating with condensation heating for reflow, advantageous for eliminating overheating of components and PCB.

VDE — Verband Deutscher Elektrotechniker of West Germany.

~ ~ ~ **W** ~ ~ ~

washable — capable of being subjected to automated washing procedures after wave soldering without diminishing electrical or mechanical life specifications; see "Washability Data" in the Supplement; other terms such as process compatible, totally sealed, and immersible are sometimes used to describe washability.

wave soldering — a method of soldering in which a wave of molten solder contacts surfaces as the PC board with components is conveyed through the process; wave width, travel speed, dwell time, etc. are varied to achieve desired results.

wiping action — sliding of contacts over one another resulting in cleaning of the surfaces.

ELEMENTS

Ag	silver	**Cr**	chromium	**Sn**	tin
Al	aluminum	**Cu**	copper	**SnPb**	tin lead
Au	gold	**Ni**	nickel	**Zn**	zinc

FEDERAL SUPPLY CODE NUMBER

NKK Switches has been assigned the FSC Number 63426 & is classified as a Commercial And Governmental Entity (CAGE) by the Defense Logistics Agency in Battle Creek, Michigan.

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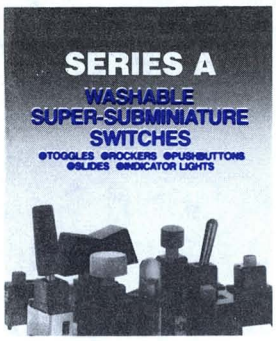

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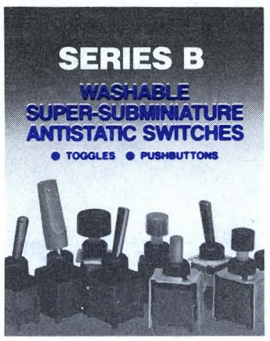

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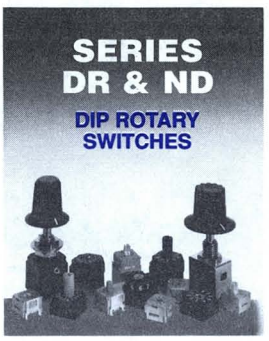

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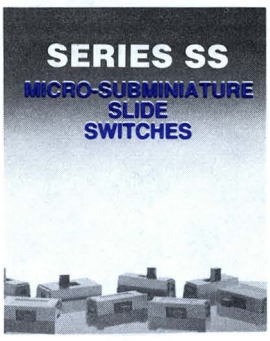

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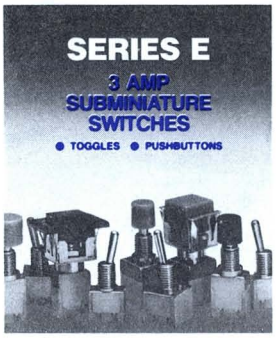

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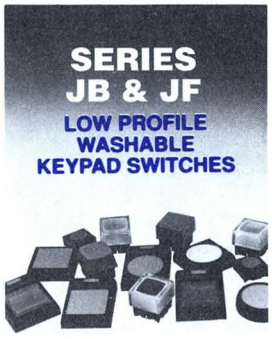

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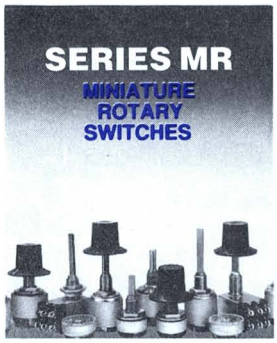

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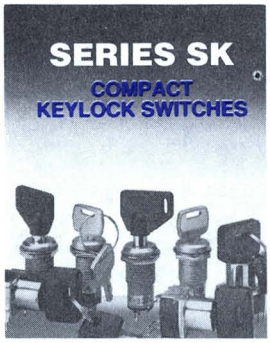

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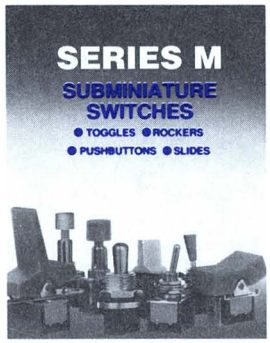

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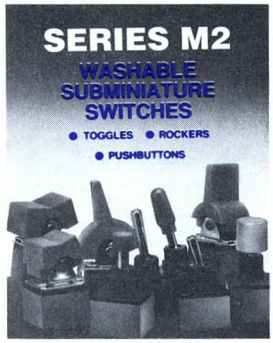

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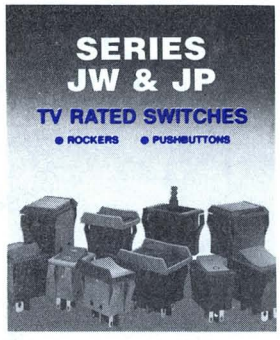

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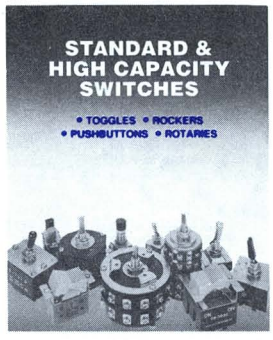

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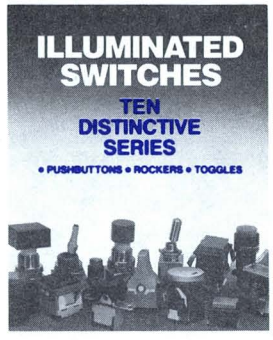

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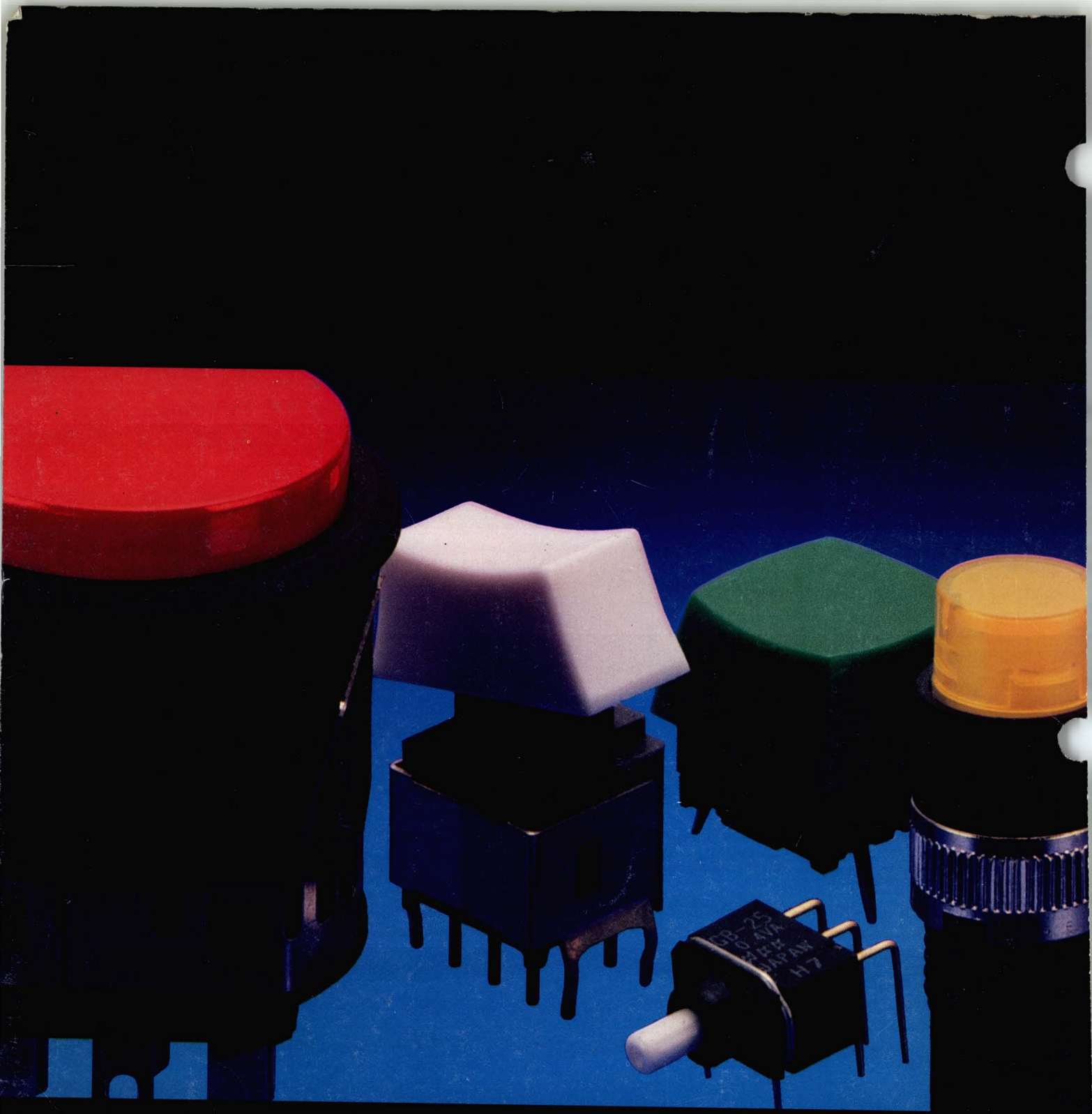

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